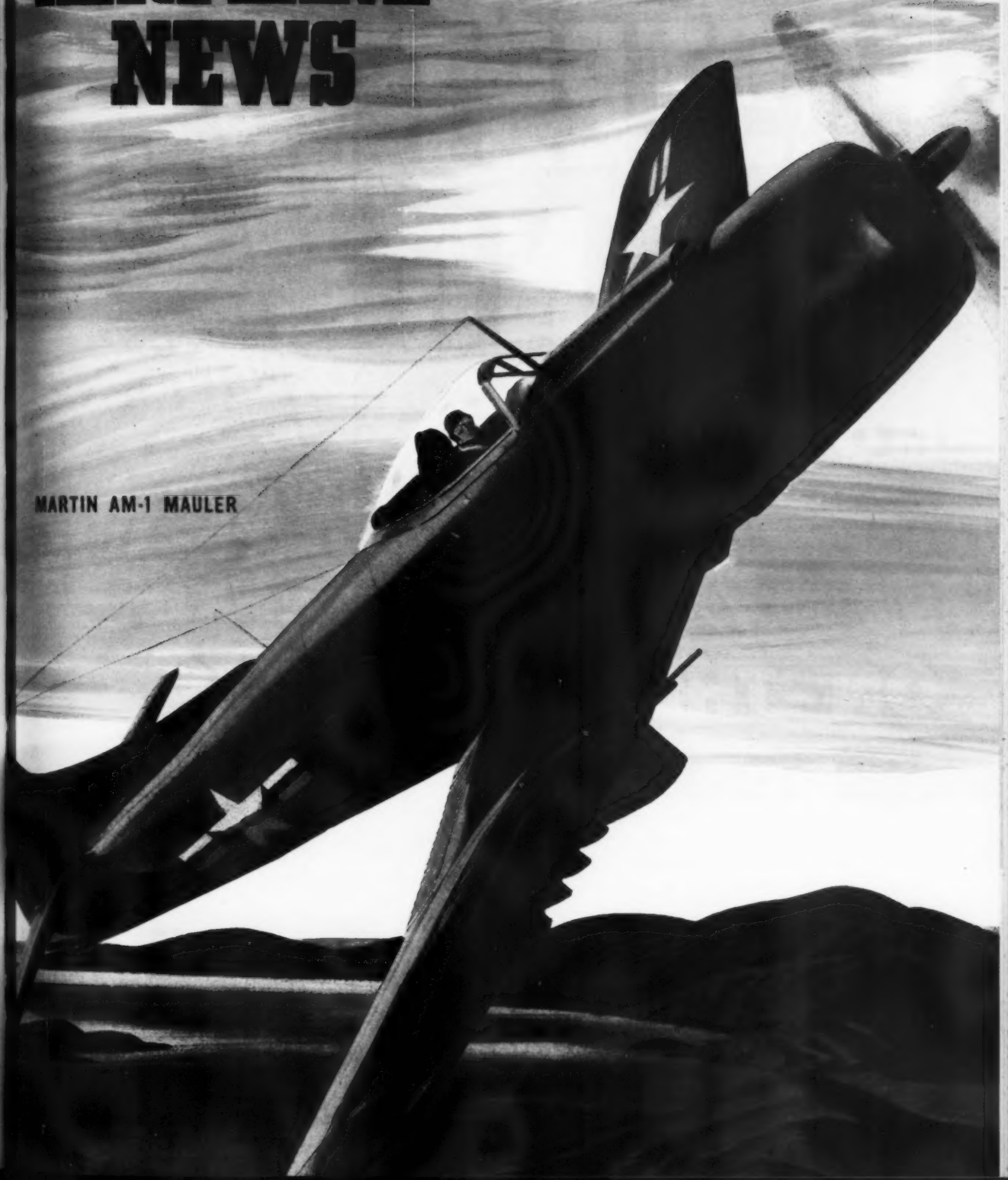
Preview of the Nationals—Unusual CO2 Contest Model

MODEL AIRPLANE NEWS

AUGUST 1948 • 25 CENTS



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PRESIDENT TRUMAN's signing of the military aviation bills puts the aircraft manufacturing industry back in business again and resumes Air Force and Navy buying of aircraft for the first time since early 1945, when large quantity procurement hesitated, then stopped altogether. Emulating the far-reaching consequences of the Morrow Board findings of 1924 (which launched Army and Navy 5 year aircraft procurement programs), the President's Air Policy Commission and Congressional Air Policy Board reports have now been implemented to the tune of $3,198,-100,000 which will bring 2727 new Air Force and 1535 new Naval Aviation aircraft during the coming fiscal year.

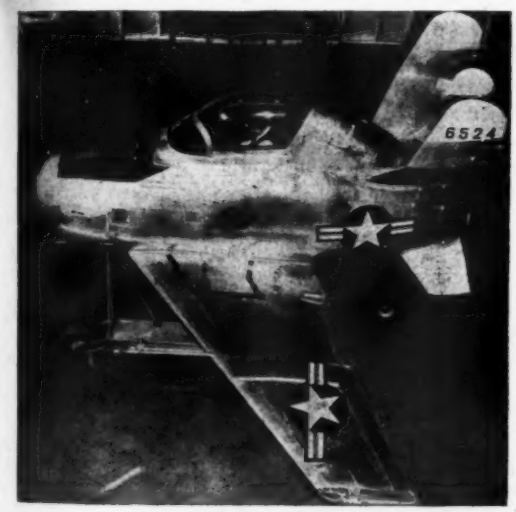
AIR FORCE 70-Group program includes the following: 22 Day Fighter Groups (1898 aircraft), 21 Heavy and Medium Bombardment Groups (709), 6 Medium Cargo Groups (331), 5 Light Bomber Groups (276), 4 Heavy Cargo Groups (166), 4 Tactical Reconnaissance Groups (247), 2 Very Long Range Weather Groups (81), 2 Very Long Range Photo Groups (81), 3 All-Weather Fighter Fighter Groups (125) and one Very Long Range Mapping Group (41), a total of 3955 aircraft. Of this total only 2727 will be new aircraft, the remaining 1228 being made up of presently available aircraft in service and a number of B-29 *Superfortress* bombers now being taken out of "moth balls" and modified at the Boeing Wichita plant.

All the new aircraft to be procured will be types presently flying. That means that none of the exciting new aircraft which have not yet made their first test flights will feature the program. Here is the way Air Force plans to build its new 70-Group force: Fighters: Republic P-84 (600 already on order); North American sweptwing P-86 (225 on order); Lockheed P-80C (not yet contracted for—improved *Shooting Star* with new Allison J-33-23 engine of 5000 lbs. thrust); and the new Curtiss P-87 all weather fighter (contract already awarded for production tooling). Bombers: Boeing B-50C (82 already ordered) and earlier B-50A (133 already in production) will be standard long range bomber with North American B-45A four jet design (96 now in production) to carry the short range tactical bombardment assignments. Cargo: Boeing C-97 (40 in production of various models) and Fairchild C-119 (37 on order) will carry the heavy loads with the Lockheed C-121 *Constellation* (10 ordered); Douglas C-124 (improved C-74 Globemaster) and Northrop C-125 (23 on order) filling special assignments. Very Long Range: Republic F-12 (20 on order) will fill many of these special weather, photo and mapping assignments. Remainder of the groups will be equipped with *Superfortress* bombers, Douglas C-54 transports and other planes now in service, such as the North American P-82 *Twin Mustang*.

NAVY 24 AIR GROUP program is designed to provide two air groups for each of 12 aircraft carriers currently in operation; one air group aboard and one ashore in reserve. This new program will require purchase of 807 fighters, 515 attack, 113 patrol planes, 20 transports and 80 helicopters. In addition, Navy will withdraw from "moth balls" 2400 planes of all types, including mostly Grumman F6F *Hellcat* and Vought F4U *Corsair* fighters, Curtiss SB2C *Helldiver* and Grumman TBF (Eastern TBM) *Avenger* bombers. In the procurement lineup for Naval Aviation are: Grumman F9F *Panther* (100 already on order), McDonnell F2D *Banshee* (27 on order), Vought F6U *Pirate* (30 on order), additional Martin AM *Mauler* (see page 19) and Douglas AD *Sky Raider* attack planes plus Grumman AF and North American AJ types; Martin P4M *Mercator* and Lockheed P2V *Neptune* search planes; Lockheed R60 *Constitution* transports and Bell and Sikorsky helicopters.

AIR FORCE HAS revealed the McDonnell XP-85 parasite fighter: and not even our "Design Forum" has produced as weird-looking a craft. Designed for stowage within the bomb bay of Convair B-36A bomber, the tiny craft features folding

(*Turn to page 9*)



McDonnell XF-85, "parasite" fighter designed to fly from B36 bombers; it has no landing gear, 21 ft. span, and Westinghouse J-34 jet engine will power it

MODEL AIRPLANE NEWS
JAY P. CLEVELAND
Publisher

Serving Aviation 20 Years

AUGUST 1948 VOL. XXXIX—No. 2

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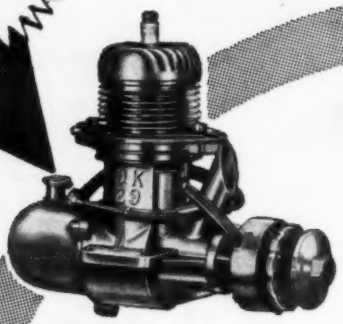

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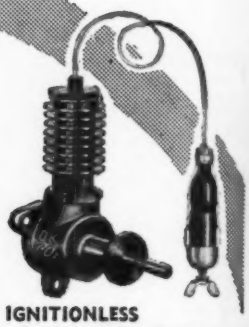

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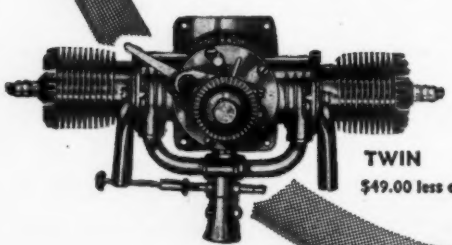

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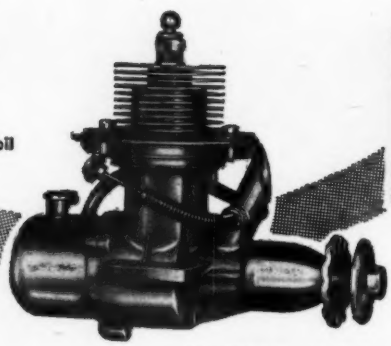

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SOME RECENT "O.K." WINNERS

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CONTROL LINE SPEED GAS MODELS
Class A, Senior record speed of 107.48 mph established by Maurice Stenglin, Dallas, Texas on February 10, 1948 with a Bantam.

COMPRESSED GAS (CO_2) MODELS
Combined class, Open record time of 14 min., 54 sec. (3 flight total) established by Joe Dodson, Hampton, Va. on March 4, 1948 with an "O.K." CO_2

CONTROL LINE SPEED GAS MODELS
Class A, Open record speed of 97.47 mph established by John Kasserman, Knoxville, Tenn. on March 9, 1948 with a Bantam.

And these are just a few recent winners announced by the AMA Contest Board . . . authentic proof that "O.K." consistently powers the champions. Watch this column in future issues for the latest records set by "O.K."powered models. So if you want championship performance,you're on your way when you say "O.K."

"O.K." ENGINES

SCRAP BOX

By BILL WINTER

PERHAPS it is because 21 years ago to the month we built our first model airplane, an *Ideal Everyboy's Monoplane*, that we feel moved to find fault with modern modeling. In the real early days—years before this ancient builder was born—there were compressed air and even gas powered models. That was an era of pioneering without benefit of previous experience, or balsa and cement for jiffy built crates. Later, after Lindbergh, it was the glamour of goggles and open cockpit that had us spellbound. We built for the love of building and yelled when a model flew. And, though the commercial gas engine made the hobby what it is today, we think of modern building in terms of organizations and contests.

Perhaps the contest is the greatest thing that ever happened, but you can make a pretty fair argument out of the point that modeling has become as much a sport as it is a hobby. It clearly is a blend of the two. What has happened to the old spirit of individualism and development? How is it possible that free-flight has been stagnant for 10 years? And rubber? For all too many of us, modeling has no goal, and the whole thing pales when building for competition finally becomes boring. Perhaps it would be better if we put stronger emphasis on various special and interesting aspects of development of the hobby, some definite goal of achievement.

Take Tex Russell, one of the older builders, who gets such a bang out of the continued development and refinement of his swept-forward flying wings with which he has even placed in Speed at the Nationals. Or Clarence Mather, whose rubber-powered canards climb, fly and glide with the best ships in the country. Or Ed Lidgard, whose experimenting with all balsa construction in rubber is gradually attaining a simple, light and strong ship comparable in weight with the built-up models. Or a fellow like Britain's George Temple, who is building a life collection of remarkably detailed and beautifully built scale jobs from plans he prepares himself from study of the real ship, be it a Caproni or a Messerschmitt. Or Henry Cole, whose years of work on flying wings is beginning to pay off.

One of the great problems in "wing" design is directional and spiral stability. Experimenters have been turning to large center fins for directional stability. Since an airfoil increases its drag more rapidly with negative angles of attack, Cole figured it would be a good idea to use airfoil sections in his wingtip rudders. If the ship yaws, the one wingtip develops more drag than the other, so tending to keep the model flying straight and under control. The principle of the idea is roughly the same as decalage. Using this new concept, Cole expects to hit the Nationals with various all-wing models from a little CO2 up to a big 13 ft. free flight (if they will let him on the train!)

But the chap we doff our hat to is an Englishman named C. Rupert Moore. As an old builder of flying scale, we freely take a back seat to this clever Britisher. From photographs it is virtually impossible to distinguish his ships from the real thing, even if it is a biplane DH Moth complete

(*Turn to page* 39)

THE Mohawk Chief

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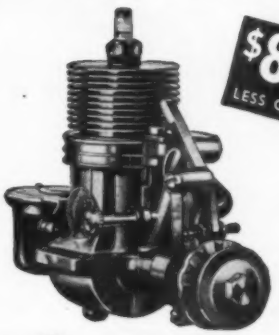

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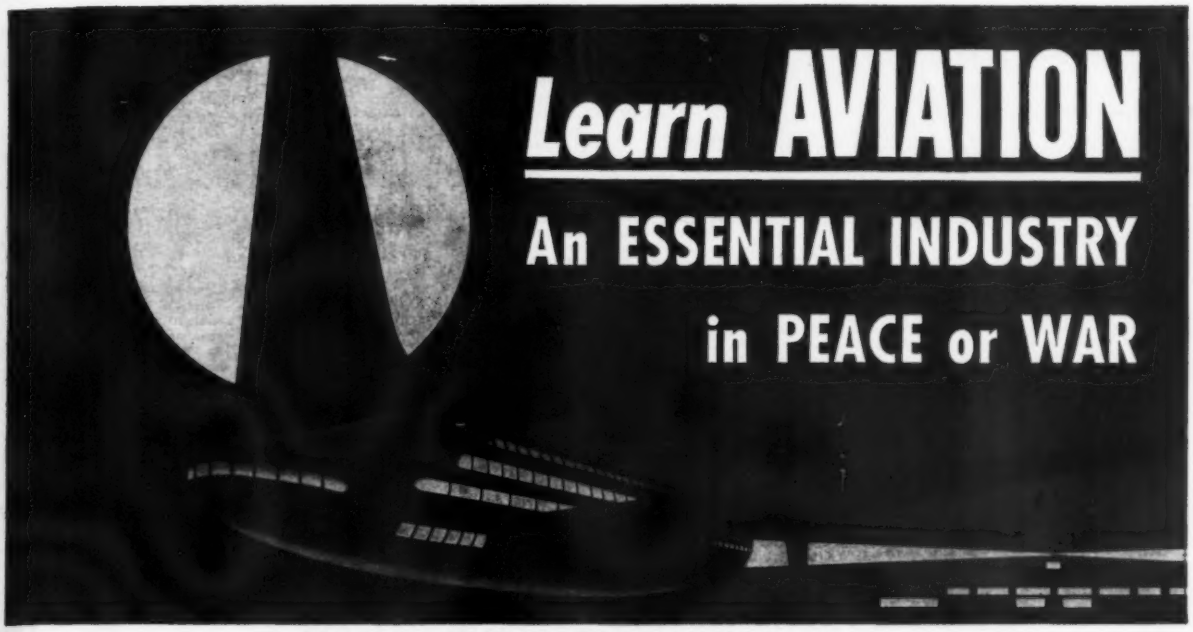

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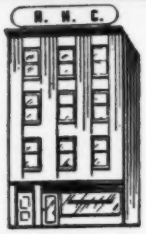

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POWER, DEPENDABILITY, LOW COST "EASY TO START"—"EASY TO RUN"

SPECIFICATIONS: .29 cu. in. displ. weight 4¼ ozs. Class B, AMA Rules

Genie 29

$6.95

READY TO RUN NOT A KIT!

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Boys! Here is the engine you've always wanted. An engine that's been acclaimed the "easiest starting gas engine." It's the lightest weight class B engine — only 4 ounces complete, it's economical to run, long lasting and available at a reasonable price. Genie gives you everything! Compare the Genie 29 with any other Class B engine on the market at any price!

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. . . With features that step-up delivered power, give longer life with light weight.

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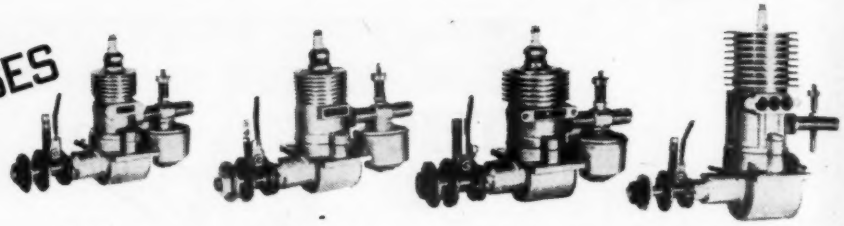

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WHO MAKES THESE ENGINES?

The BUZZ Engines are manufactured by a company that for years has been the world's largest maker of automobile replacement pistons and other precision gasoline engine parts. Thousands of gas engines and parts were made during the war by this company for the War Dept. for use in walkie-talkies, field generating sets, etc., etc. Since the war, thousands of gas engines have been made for scooter, lawn mower and other industrial uses. When we say unconditionally that the BUZZ engine is well engineered and well constructed, will give you plenty of good service, this is no idle boast, but a fact!

NOT A CLEARANCE SALE!

As the owner of a BUZZ Engine, you are sure that you will always have available full service for your engine, as well as replacement parts. You will never have an "orphan" engine on your hands. We guarantee service and parts for your engine for at least five years.

PRECISION ENGINEERED!

Despite its low price, the BUZZ Engines have been engineered to the last decimal point. Pistons and cylinders have been carefully burnished by a special patented process within .0002 of an inch. All bearing surfaces are made of selected materials and finished with the most costly care and equipment. Even a Champion Spark Plug is included. Every BUZZ Engine is indeed a jewel of precision engineering.

FULLY GUARANTEED!

With each and every engine is included a full 30-day written guarantee against defective parts and workmanship. You take no chances with BUZZ Engines. In addition, service and replacement parts are guaranteed for at least five years.

FULLY GUARANTEED

Factory assembled— ready to run— including Champion Spark Plug

BUZZ A, B or C $4.95

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SERVICE & PARTS SUPPLY Guaranteed FOR 5 YEARS!

1948 MODEL ENGINES AT LOWEST PRICES EVER!

NOT A CLEARANCE SALE 1,000,000 Engines Available

NO SALES TO DEALERS

Due to low price, none sold to dealers. All the savings are passed on to you.

Engine prices are introductory only. Effective Oct. 1, prices will be increased 100%.

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Do not judge the BUZZ Engines by their low prices. It is true we make very little money on each engine sold. But because many, many thousands of these engines have been produced by the latest modern processes, the cost has been reduced so that they can sell at the lowest prices ever seen.

PRECISION ENGINEERING OFFERS:

- Construction and materials that permit use of engines in boats and cars as well as airplanes.
- Complete instructions.
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- Steady, consistent running.
- Lightest weight engines ever made in relation to power produced.
- All wearing surfaces especially finished for longer wear.
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- Last but not least, we maintain an inspection and testing department where your engine gets the last word in care not only before it is shipped, but where it can receive expert attention if anything goes wrong after you own it.

NOW YOU CAN AFFORD THE BEST!

SPECIFICATIONS

	A	B	C	D
Displacement	.199	.299	.350	.510
Bore	.66	.812	.880	1.00
Stroke	.562	.562	.562	.777
Horsepower	1/7	1/6	1/5	1/4
RPM	7,500	8,000	8,500	9,000
Propeller	8"	10"	11"	12"
Weight (ozs.)	4	4½	4½	9

COMPLETE ACCESSORY UNIT

Sold only with each BUZZ Engine

Coil-Condenser-prop-switch high tension wire-ignition wire-coil holder-battery box-wrench-presto engine starter, No. 70 oil.

ONLY $1.49

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(*Continued from page* 1)

wings, an unorthodox quintuple tail (3 fins above, 2 below) and a retractable hook with which to engage the trapeze in the B-36 belly. The odd fighter is truly a "parasite" for it has no landing gear! With only 21 ft. span the minute speedster is powered by a Westinghouse J-34 axial-flow turbojet engine of 3000 lbs. static thrust; this combination of small size and great power will give the plane a top speed well up in the 600's. At present, however, its future looks dim because the Air Force will shortly announce a severe cutback in the B-36 program due to obsolescence of the brobdingnagian bomber design.

WORLD'S FIRST turboprop-powered flying-boat, the Convair XP5Y-1, is scheduled to fly early next year. It is powered by four Allison T-40 axial flow dual units geared to huge, four bladed propellers. Each of the engines is actually two engines in one geared to a common shaft. The P5Y features the new planing tail hull and high length-beam ratio hull perfected during the war by NACA in its two huge towing tanks at Langley Memorial Aeronautical Laboratory.

ALSO USING this radical new NACA hull is the Martin XP5M-1 (who said the flying boat is a "dead duck"?) search plane developed from wartime PBM design. The new plane features an extension of the hull planing surface completely to the extreme aft end of fuselage. Another feature is a huge single vertical tail with generous dorsal fin, two new Wright R-3350 Cyclone engines of 2700 hp each (compared to 2200 hp in wartime R-3350). Range of the P5M may be further increased by use of sponson fuel tanks, which attach to exterior of the hull along the waterline (as on Boeing 314 Clipper flyingboats) and are shaped to provide buoyancy during water operations, thereby supporting weight of the fuel they contain.

PRODUCTION VOUGHT F6U *Pirate* features a "new look" with rounded afterbody and new dorsal fin. The rounded aft fuselage contains the first production installation of a jet "after-burner" to provide great bursts of power for short periods, such as during takeoff or in combat. The idea of the afterburner arises from fact that although the temperature of the hot gases at the turbine must be kept cool enough to prevent damage, there is still plenty of air left over, that usually passes out of the tailpipe. By injecting fuel into this tailpipe the excess air is utilized, extremely high temperatures may be used (since the burning takes place aft of the turbine), and thrust may be increased as much as 50% over the standard rating of the engine. However, the afterburning is extremely wasteful of fuel and for this reason cannot be used for any length of time (over 5 minutes). Although only 30 F6U *Pirates* are now under construction, Chance Vought is setting up its new Dallas facility for quantity production of the craft under the new Navy program.

NAVY IS SEEKING Congressional approval for construction of the largest vessel ever built: a 65,000 ton aircraft carrier! The 1090 ft. flight deck will be 70 ft. longer than the *Queen Mary*. Of even greater importance (to those who must fly tricky jet craft aboard) will be the 190 ft. flight deck width, more than half again as wide as the huge *Midway*-class (*Midway, F.D.R., Coral Sea*) carriers now in service. The giant ship is designed to handle aircraft up to three times as heavy as those used during the war, and this would include the huge Lockheed P2V *Neptune* and Martin P4M search planes. The Lockheed P2V "Truculent Turtle" was recently flown from deck of the *Coral Sea* off the Virginia Capes without incident. The giant craft, holder of 11,000 mile world's distance record, used JATO for takeoff and carried a full military load at a gross weight of 60,000 lbs.!

AND SPEAKING OF flying jets aboard carriers, the Navy now has mastered the

(*Turn to page* 64)

STUNTERS! YOU CAN EVEN DO *Consecutive* SQUARE LOOPS!
with SNAFU's NEW
MAGICIAN

Only $3.95 — a rugged 40" stunter that easily out-performs bigger, heavier-engined ships—using a .23 through .45 engine

The MAGICIAN is GUARANTEED *to do every stunt in the book, and any others you can think up—inverted or right-side-up—and no mushing.*

You can do:

- Consecutive Inside and Outside Square Loops
- Consecutive Loops
- Consecutive Horizontal & Vertical 8's
- Hand-Launch Take-Offs for Rough Fields
- Vertical Hand Launch Take-Off

The MAGICIAN gives you HIGH SPEED IN THE AIR—yet glides in to a 12 m.p.h. feather landing.

The MAGICIAN is EASY AND QUICK TO BUILD—only four hours to assemble the prefabricated parts for this sharp little ship if you are fast—eight hours if you want to take your time.

COMPLETE INSTRUCTIONS—FULL-SCALE DETAIL DRAWINGS—Included With Each Kit

- *Completely stable—the Magician is easy for amateurs to fly*
- *Instant response to controls—delights the experts*

TROPHY CHAMPS LIKE MAGICIANS SO WELL THEY ARE BUILDING 2, 3, and even 4 OF THESE WONDERFUL STUNTERS FOR THEMSELVES

SNAFU COMPENSATOR

For smooth, steady power in any position install Snafu's Compensator (Pat. Pend.). Gives new power to your ship when installed flat (horizontal) directly opposite the needle valve. Snafu Compensator provides a constant flow of fuel to your motor during the most violent manoeuvers—helps to keep your glow-plug engine running at peak performance.

Only 65c each

Complete and ready to install

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give you maximum utilization of your power. Use a Snafu "75" Blue-tip with your Sportsman, Torpedo, or similar h-p engine.

Snafu "75" 10" diameter, 4-6-8-10-12 pitches 60c ea.
Snafu "90" 12" diameter, 6-8-9 pitches - - 60c ea.

Get the most out of your Magician and your other speed and stunt ships by installing

SNAFU COMPENSATOR & SNAFU FLY-WHEEL PROPELLERS

See Your Dealer TODAY or write SNAFU NOW giving your dealer's name

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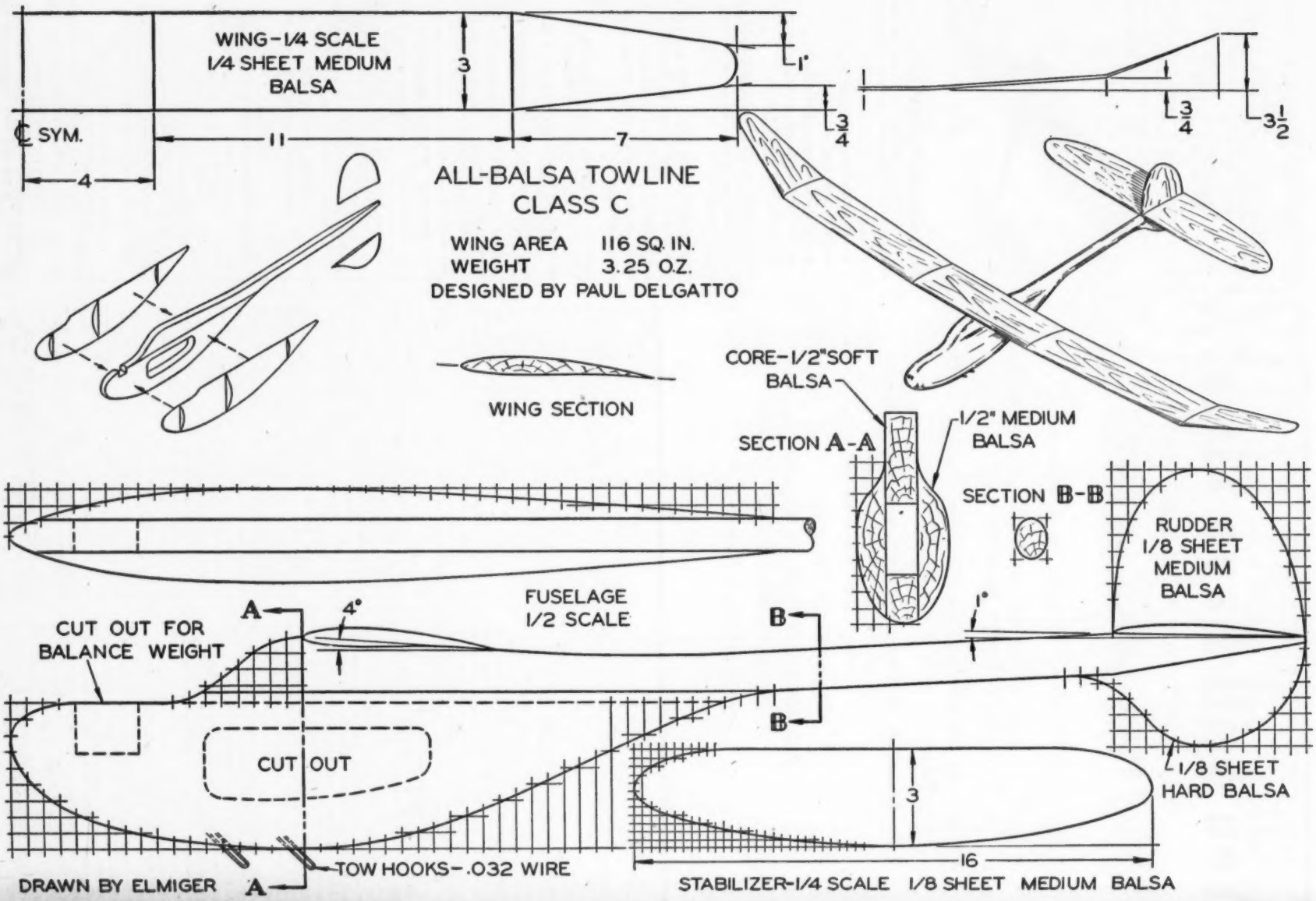
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3 1/2
℄ SYM.
4
11
7
ALL-BALSA TOWLINE
CLASS C
WING AREA 116 SQ. IN.
WEIGHT 3.25 OZ.
DESIGNED BY PAUL DELGATTO
WING SECTION
CORE-1/2"SOFT
BALSA
1/2" MEDIUM
BALSA
SECTION A-A
SECTION B-B
RUDDER
1/8 SHEET
MEDIUM
BALSA
FUSELAGE
1/2 SCALE
4°
1°
A
B
CUT OUT FOR
BALANCE WEIGHT
CUT OUT
TOW HOOKS-.032 WIRE
1/8 SHEET
HARD BALSA
3
16
STABILIZER-1/4 SCALE 1/8 SHEET MEDIUM BALSA
DRAWN BY ELMIGER

Beginner's Towliner

A clean design capable of excellent performance, we recommend this model to beginners

by Paul E. Del Gatto

HAVE you ever had the urge to build a model the night before a contest? Well, I did.

The result was a Class C towline ship that performs as well as its big brother towliners. It is stable on the line and will take a long towline, in fact much more than is required in competition. All these desired characteristics are due to the nature of the design, which incorporates a high aspect ratio wing with low drag characteristics; also the fact that the model is constructed entirely of balsa wood, therefore reducing skin friction to a minimum.

Through careful selection of balsa for the various parts, this towliner can be made light enough so that the model will not exceed the required weight for A.M.A. rules. The original weighed slightly less than 3 oz., while the ballast brought the weight up to 3-1/4 oz. Since present rules call for 4 oz. per 100 sq. in., the model must weigh at least 4-1/4 oz. for contest flying.

WING AND TAIL CONSTRUCTION—To construct the wing, select a sheet of balsa 1/4" thick, quarter grain preferred. The desired wing profile is shown on the plans. With the aid of a long blade knife, rough out the desired shape. The undercamber is sanded in with the aid of rough sandpaper. The stabilizer is made from 1/8" sheet stock. However, it will be necessary to lay out grids for the full size pattern, which will be four times the size of those on the drawing. Therefore they will be 1/4" squares. The next step is to reproduce intersection points in order to obtain identical curvature.

The rudder and sub-rudder are similarly constructed with the exception that the drawing illustrates it half scale. However, for full size the grids are still 1/4" square.

FUSELAGE CONSTRUCTION — The fuselage consists of four pieces: the boom, centerpod, and two sides for the pod. The boom is blanked out of a piece of hard balsa stock, 1" x 1/2" x 17-3/8". Do not shape the boom until all parts of the fuselage are assembled.

To construct the pod, first draw sufficient grids consisting of 1/4" squares and outline the shape of the pod, referring back to the half scale drawing. The sides of the pods have the same shape as the center except for the portion which overlaps the joint between center pod and boom. This overlap eliminates almost entirely the possibility of breaking there.

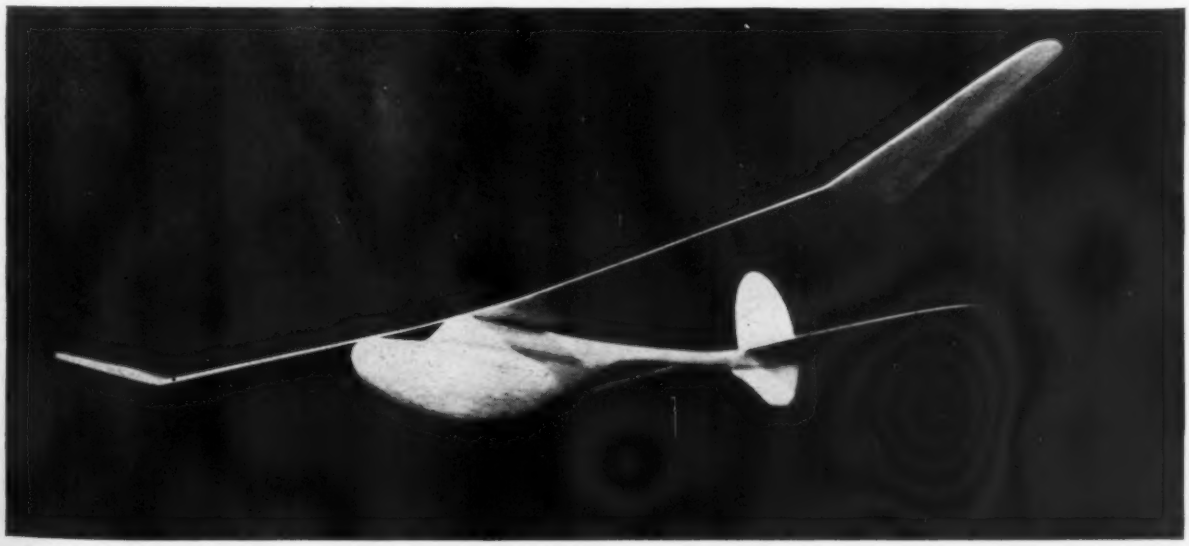
To assemble the fuselage, first glue the boom to the center pod or core. Allow to dry for about an hour, then cement the sides in place. Allow another hour for drying. Meanwhile, the towhooks can be bent to shape and the finish prepared.

After the fuselage is dry, carve to desired shape as illustrated on the drawing.

FINISH—The original model had just a clear dope finish in order to keep the weight of the model down to a minimum. However, use your own discretion and suit your taste. Sand all surfaces with 5-0 or 7-0 sandpaper before applying a primer coat of clear dope, after which 10-0 sandpaper should be used for sanding between coats. After each coat of dope thin down consistency of the dope. This helps to give a smooth glasslike finish. Using the procedure outlined, four coats of dope should be more than sufficient.

ASSEMBLY—On the original model, both wing and tail assemblies were glued in place. This was done to allow for the maximum amount of streamling, which is of utmost importance for outstanding performance. However, if you prefer, insert dowels and a wing platform for removal of the wing.

FLYING AND ADJUSTING — Insert sufficient ballast in order to obtain a glide that gives just a slight stalling tendency. Then, with about 20 ft. of line, tow the glider up and release, noticing which way the glider turns. This will indicate warps in the surfaces. Keep using a short tow until necessary left turn adjustments are made, to insure thermal flights. Then let out the tow and watch her sail!



STABILIZER-1/4 SCALE 1/8 SHEET MEDIUM BALSA
DRAWN BY ELMIGER A—
1948

Author C. O. Wright compares his R. C. Sailplane with Val Sherrard's control liner

Preview of The Nationals

by C. O. WRIGHT

Control line Director L. L. Cooke

Captain C. Keene commands Olathe N.A.S.

Tom Wardlaw will be the Director of all free flight outdoor activity

Jim McClelland, C. D. for indoor events

Behind the hat, June Pierce, R. C. Director

DIAGONALS drawn on the map of the United States cross at the approximate geographic center of the country: the U. S. Naval Air Station at Olathe, Kansas, and location of the 1948 Nationals. Spot Kansas City on the map and you'll find model airplane conscious Olathe, 20 miles to the west on U.S. Highway 50.

Outdoor events of all categories will be held at the mile square Naval Airport, and indoor flights are scheduled for the large modern Municipal Auditorium in Kansas City with its unobstructed ceiling almost 100 feet above the floor. The red letter dates for the 17th Annual Nationals are August 4, 5, 6, 7, and 8. The contest will be open to all, with events for young and old, and there will be abundant hardware worth a place on anyone's mantle.

Olathe Is On the Ball

Olathe (pronounced Olatha) is a thriving rural community of 5,500; it has a most up and coming Chamber of Commerce, and a spirited local American Legion Post. After a large and successful Control and Free Flight meet last summer the Olathe boosters became nationally conscious and rushed their bid for the 1948 Nationals. They put the sanction fee cash on the barrelhead. The Olathe boosters recruited support everywhere; and when Frank Nekimken and others were in Kansas City at the annual meeting of the Mid-States Model Aeronautical Association on Jan. 1, the visitors were taken to the Naval Station and the Municipal Auditorium to look over the prospects. Lt. Com. Tex Witherspoon of the Naval Base turned on his customary charm and Dale Dorst of the Chamber of Commerce was at his best. The visitors were greatly impressed with all the facilities and with the leaders' enthusiasm. Frank wrote an alluring report to the AMA Contest Board and Olathe's cordial invitation was accepted and the dates set for the first week in August.

Housing For All

The Navy has offered the works for the contest. For boys and men there will be barracks, beds and regular Navy food at the Station for 1,200—at the unbelievable price of a dollar a day, plus two-bits for linen for the week. The buildings at the station are of brick, and the quarters are modern in every respect. The installations are a credit to the Navy and the concrete runways are large and smooth, ideal for Control and ROG.

Incidentally, the Navy's swimming pool at the Air Station, which is really a beauty, will be open to contestants throughout the meet. When you return from a long chase cross country after your ship, think how good that pool will feel!

The Navy states that each person living at the field will be assigned a full length locker, and *each should bring his own padlock and key* for this locker.

There are a few tourist camps at Olathe, and a small hotel and private rooms for those who bring the women of the family. Then, 20 miles east, Kansas City has tourist camps, motels and hotels in large numbers. Twenty-five miles west is Lawrence, the state university town, with accommodations; and a short 25 miles farther west is Topeka, Capitol of Kansas, home of the *Top"e"kans Model Club*, Val Sherrard, the *Mid-States* president, and the AMA Prexy. Olathe is in the very center of things, all of which contribute to a well planned meet. And while the blessings are being listed,

(*Turn to page* 32)

design forum

By CHARLES H. GRANT

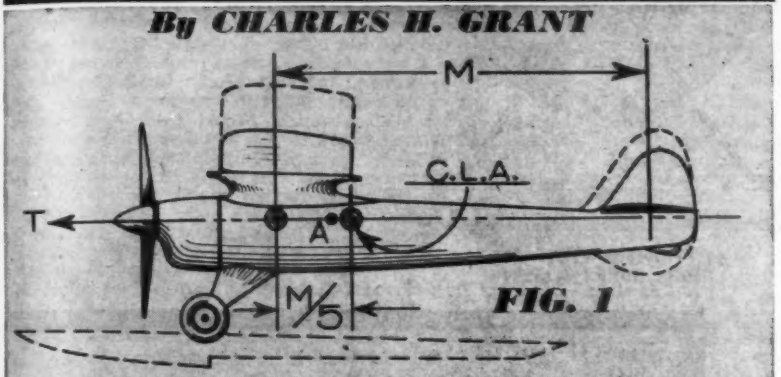


FIG. 1

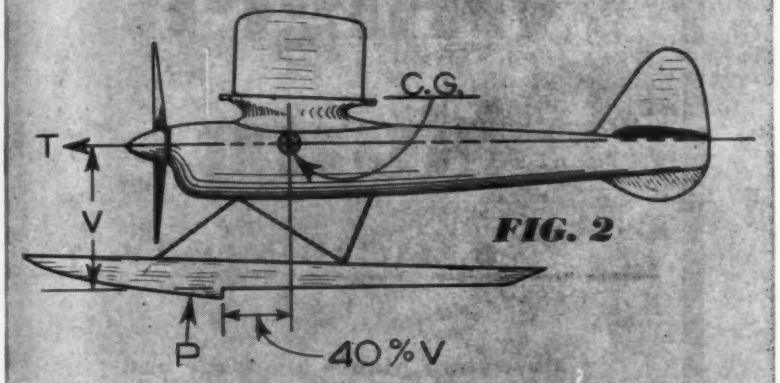


FIG. 2

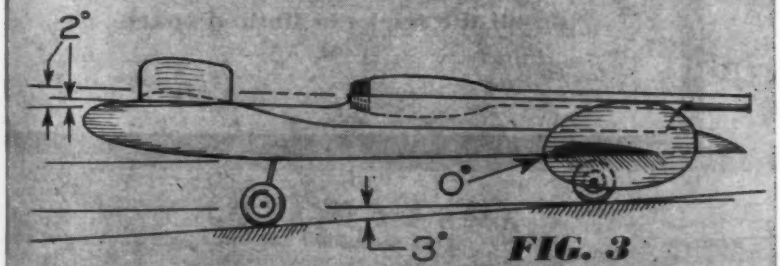


FIG. 3

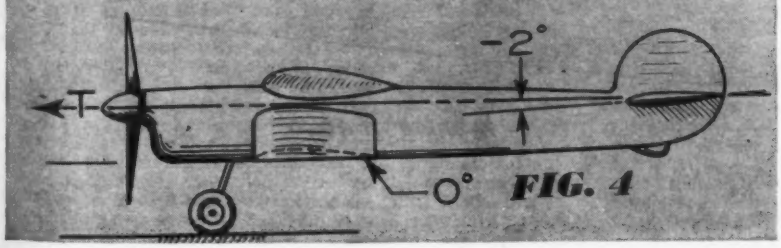


FIG. 4

HAVE you ever stopped to wonder why full scale airplanes are not designed like models and vice versa? Val Rich of Montpelier, Idaho, has been trying to work out the answer to this question. He phrases it this way in a letter: "Why don't full scale planes follow the design procedure of model planes?" This question hits at the very root of design procedure for both types.

To find the answer we must go back 50 years to the day when Langley's first power driven model flew for more than a half mile over the Potomac River. This plane had a wingspread of approximately 16 feet (the exact figure is in doubt), was powered with a steam engine, and weighed approximately 27 lbs. This plane was the prototype of all model planes, or we might say pilotless aircraft. Like its descendants it had to be inherently stable in order to remain in flight. Any reaction to side gusts or other air disturbances that might turn the plane from its normal flight course had to be corrected by forces generated within the airplane *because of the ship's design*. The fact that the plane changed its attitude and flight position had to produce correcting forces which returned it to normal flight.

Langley's feat was extraordinary because he not only built a plane with sufficient aerodynamic efficiency to fly under its own power, but he also proportioned it and set the surfaces at such attitudes that it directed itself in flight and remained right side up. If Langley's later man-carrying plane had succeeded, the whole history of aviation would probably have followed a different pattern. However, a small thing like a faulty launching device caused the plane to crash on takeoff and it stopped development of full scale planes.

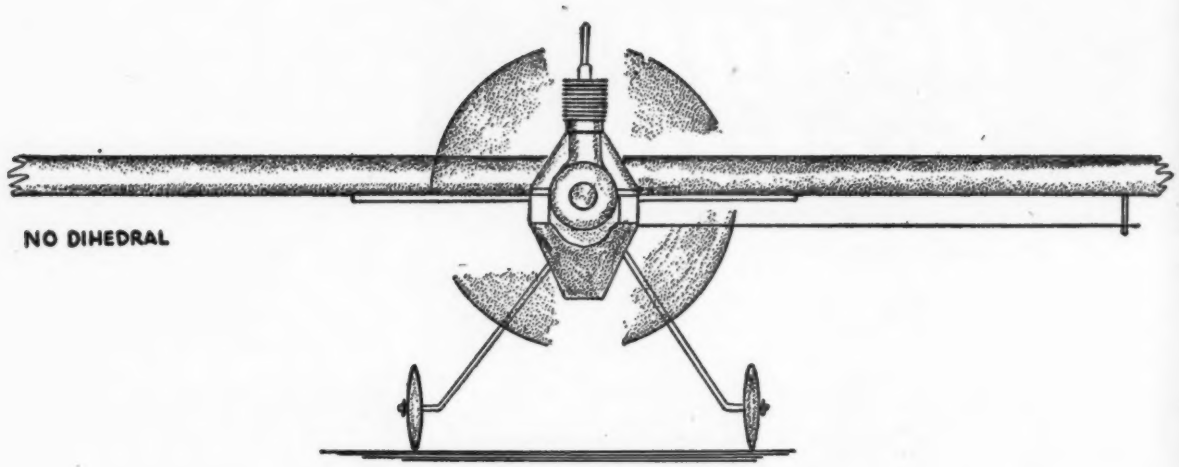
Subsequently the Wrights developed their airplane, in which they sidestepped the problem of inherent stability and substituted controls which the pilot could operate to balance the airplane in flight, as well as to change its course at will. In all other vehicles, except the bicycle, the controls serve only to direct the vehicle's course. The wheel of an automobile steers it left or right but in no way functions to retain or restore balance. When the Wrights demonstrated that a pilot could balance an airplane and direct it, through controls, the problem of inherent stability was forgotten.

The greatest problem was weight-carrying and speed in order to develop the airplane into an efficient military weapon and means of transportation. So, since that day in the early 1900's, designers have been concentrating primarily on aerodynamic efficiency and controlling the craft by auxiliary control surfaces. Little or nothing that is new has been added to the knowledge of inherent stability in these years except information contributed by model plane scientists. Any inherent stability that full scale aircraft might have had came as a result of attempts to increase efficiency or by chance, not from deliberate attempts to make the airplane inherently stable.

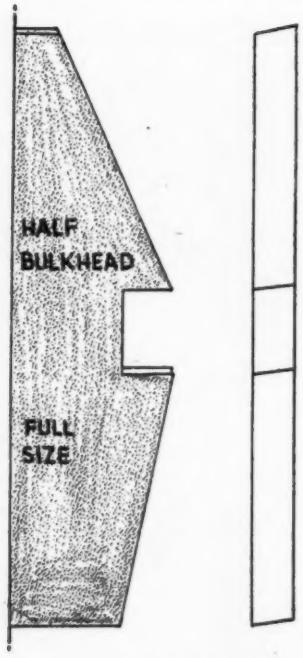
Many airplanes had no stability at all. Outstanding examples were the Wright airplanes which required continual manipulation of the controls in order to keep them from going naturally into some disastrous maneuver. In other words, control was very critical.

Since that time some airplanes have been developed which will fly themselves during certain conditions of flight. For instance—when flying straight the hands

(*Turn to page* 59)



FRONT VIEW.
(ONE QUARTER SIZE)



1/4 PLYWOOD

Ginger Snap

by JACK BAYHA

Most stunt planes are large and high-powered; this little one will do all the tricks in limited space

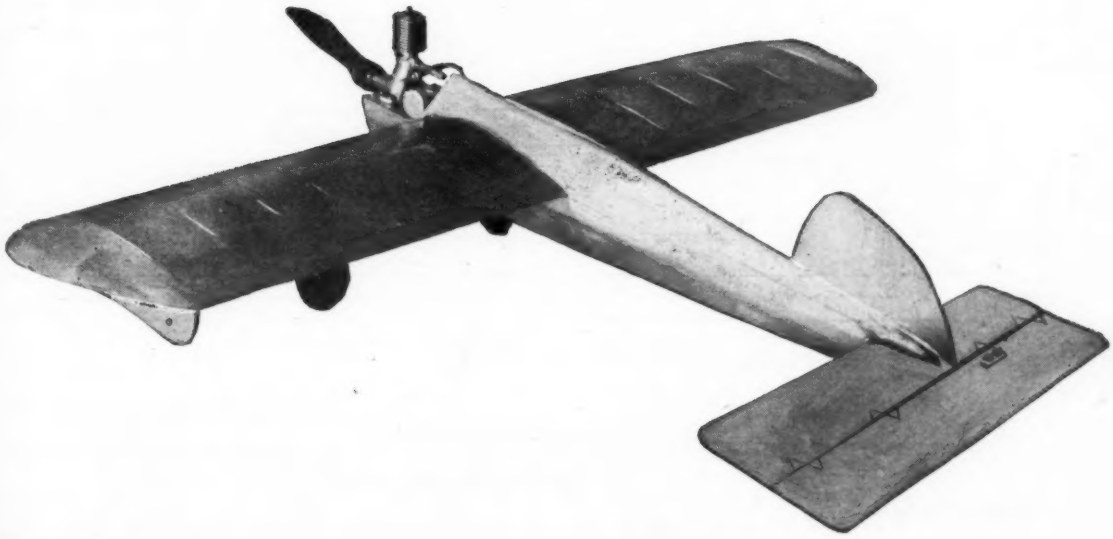
1/8 BALSA 11 REQ'D

UNTIL the time we made our first flight with *Ginger Snap* we were firmly convinced that to fly stunt with a Class A engine was impossible. It took only one flight to completely change our mind. This tiny *Micro-Diesel* powered model not only flies very ably but is actually easier to fly than its big brothers.

Its very lightweight makes it handle nicely with the small .130 displ. engine it was designed around, and the engine's smooth even operating characteristics make flying a pleasure. The size of the engine of course keeps our operating speed down, since this is a fair sized airplane. This reduced speed is responsible for *Ginger Snaps'* amazingly easy stunt performance. It moves slower, so you have more chance to make up your mind, and a better chance of keeping the ship in one piece. Its lightweight also helps it stay in one piece after you pile it in, as even the best stunt flyers will do occasionally.

The *Ginger Snap* stems in design from the *Dronette* which has served as foster parent to so many stunt models in the past. Lee Shulman's basic design has served me well for the past year or more as I have flown dozens of ships which stemmed from the *Dronette*. Being basically a *Dronette*-type ship, the present design is in good company, sharing the same forebear with the *Hot Rock*, National Stunt Champion. We feel that we should give credit where due, and we give Lee credit for the basic design type which the *Ginger Snap* follows.

The original ship was flown with a *Micro-Diesel* and performed with near amazing ability. There is no reason to believe that this ship should not perform well with other engines of equivalent power. It should give excellent results with gasoline engines up to .230 displ. when operated with a glow-plug. With other small diesel engines it should perform in direct proportion to the amount of power available. It is important in a ship of this nature that the engine operate smoothly, so use care in engine choice. The original has been flown on every length line imaginable, from 15 to 50 ft. Performance on long lines is excellent; however the low weight of the model may cause trouble on long lines in windy weather. The ship has actually been flown inverted on 22 ft. lines, so it is obvious that long lines are not too essential.



CONSTRUCTION—The ship is built on two crutch-like members which run the entire length of the fuselage. These members are the main structure of the ship and should be carefully aligned. The engine mounts are securely glued to this crutch, as is the elevator, and the wing. It is recommended that this crutch be assembled to the tail, the wing installed, and the controls entirely assembled as the first step in construction. The firewall of 1/4" plywood is securely glued to the crutch and to the motor mounts. The landing gear is fastened to this firewall with three J-bolts. The width of the fuselage is readily changed to accommodate engines of other sizes by merely moving the engine mount blocks nearer or farther apart. This will cause the entire fuselage to become narrower, or wider, but this is of no consequence whatsoever.

When installing the controls it is important to assure that they operate smoothly and with no evidence of binding. The control lines on this ship do not run inside the wing, since it is felt they can be made to operate more freely on the outside of the ship. The elevator must have at least 30° travel in each direction, and a full 5/8" of rudder offset must be used. Unless you are accustomed to flying clockwise, it is recommended that you make the ship as shown for counter-clockwise flight. It is admittedly disadvantageous from a torque standpoint to fly that way; however the opposite direction of flight is too awkward for most. The performance of the ship will be better if flown clockwise; we have found it to be adequate counter-clockwise, however.

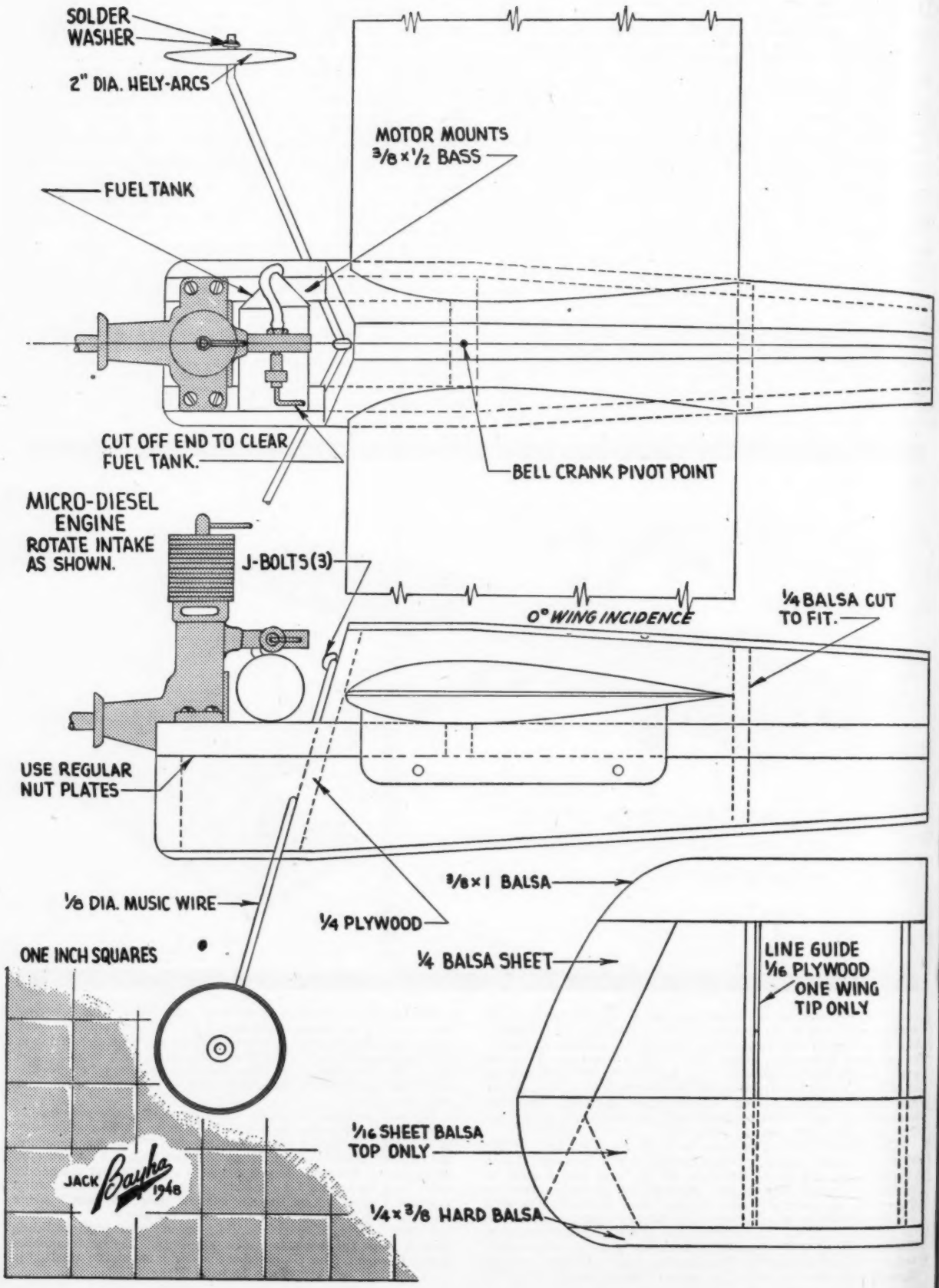
The wing is built in one piece. There is no dihedral and absolutely no incidence. Any wing incidence whatsoever will make the ship very tricky to fly, and will make inverted flight almost impossible. Only the top of the leading edge is planked; this is done with 1/16" soft sheet balsa. The bottom may also be covered; however we have made every effort to keep the weight of the model down. The wing has stood up very well in our ship with only the top covered with balsa. Remember that one of the secrets of *Ginger Snaps'* ability is its very light weight. In order to "ruggedize" the ship it is covered all over with Silkspan G-M. This covering will make the ship sturdy and enable it to take the beating to which it is subjected in stunt flying.

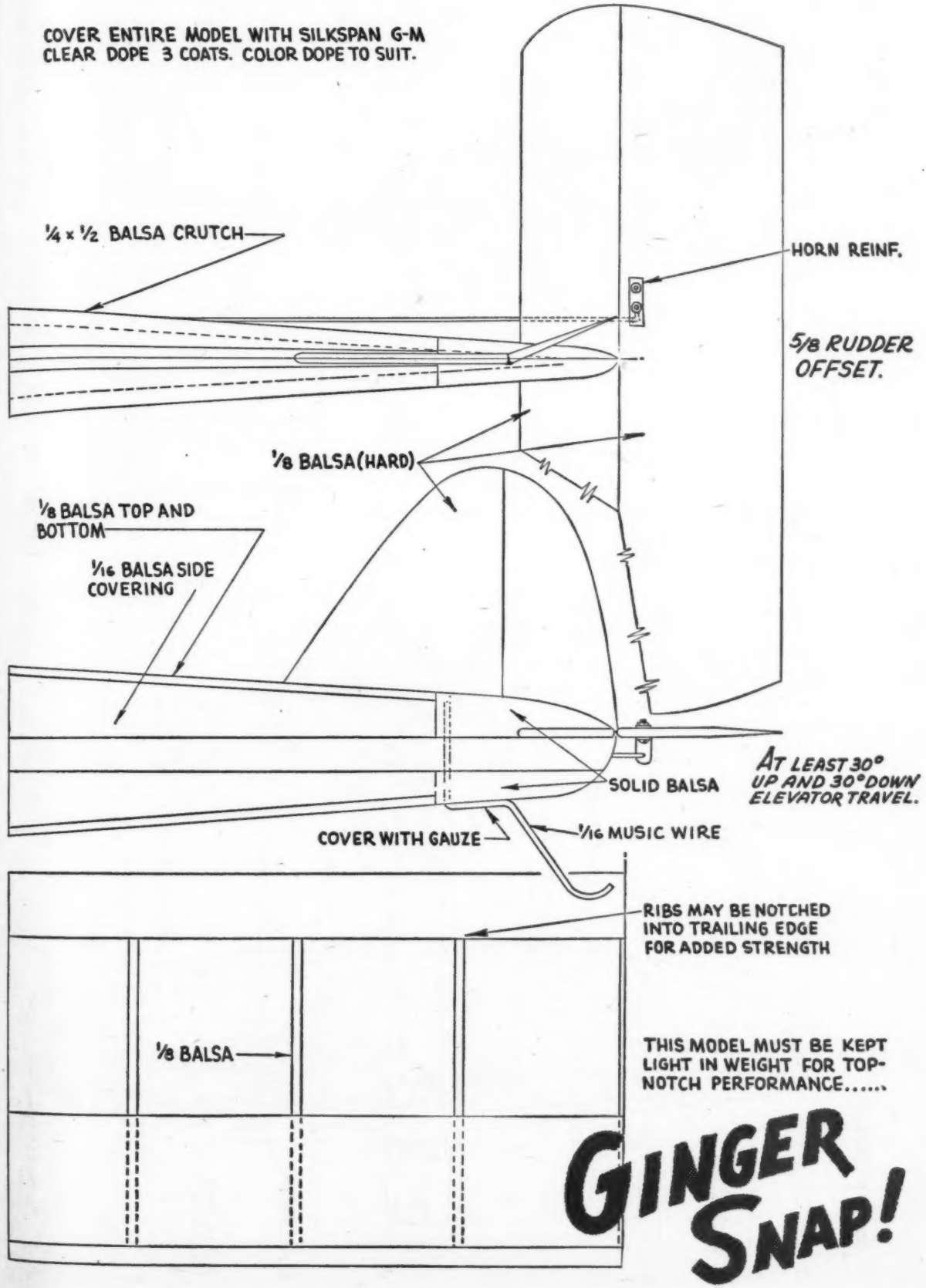
The tail of the fuselage is made of solid balsa. This is necessary to allow adequate mounting of the tail skid which is very important. The tail skid is installed as shown, then covered over with gauze, which is then liberally coated with cement. The use of Hely-arc wheels is recommended because otherwise the ship's low weight will cause it to bounce on landings, touches, and on takeoffs.

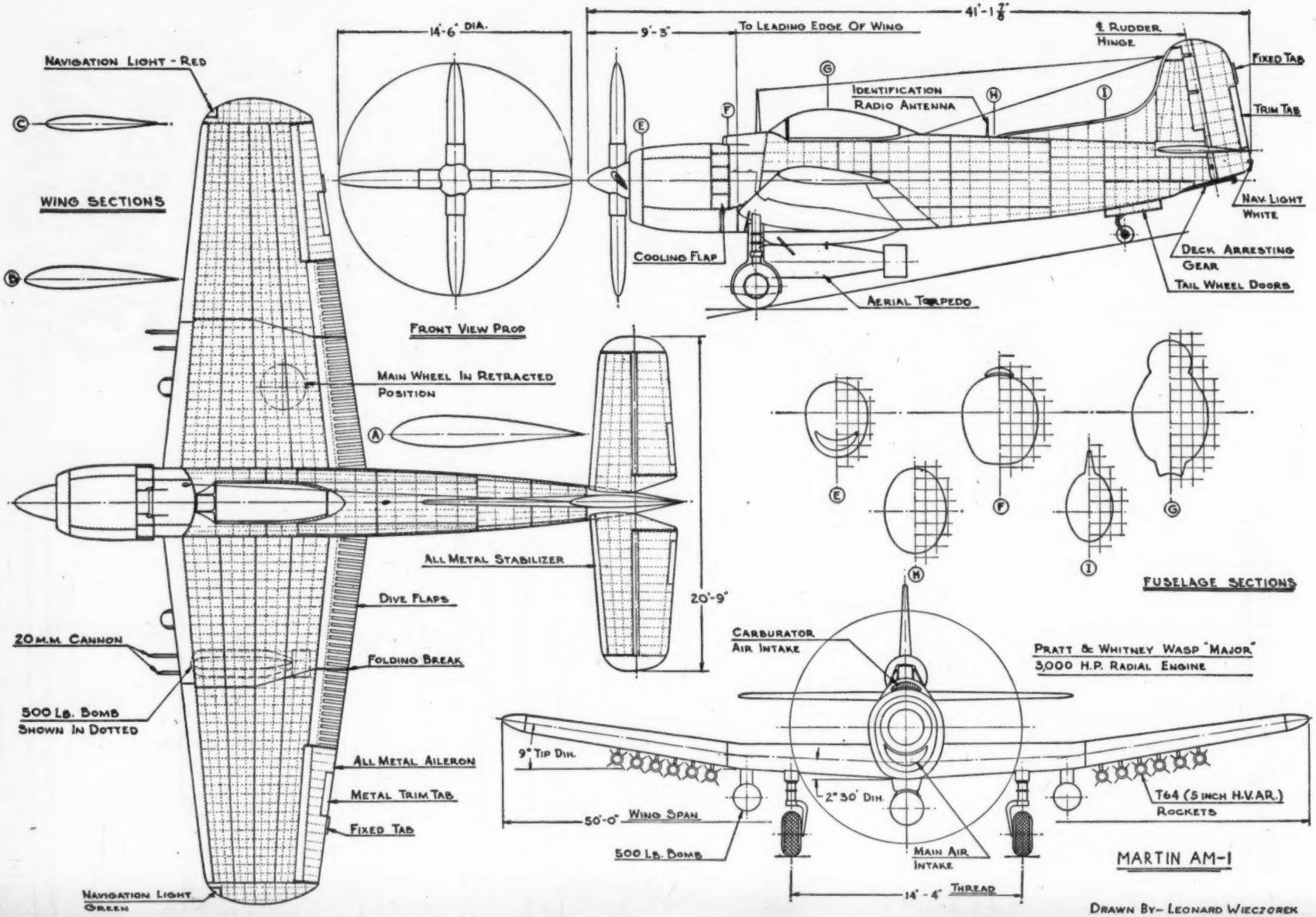
The nose section should be carefully cemented, then coated with cement for added strength. The *Micro-Diesel* engine used in our original model was mounted with #6-32 screws, using the conventional soldered nut plates. The tank is a special type designed for stunting. Use of this tank requires that the needle valve and its intake tube mounting be turned to a horizontal position. Depending on the size of tank used, the needle valve extension tip may have to be cut off short also.

FLYING—We have deliberately been brief with building details since the construction is so simple. Flying is another thing, however. The *Ginger Snap* is the most stable small ship

(*Turn to page* 63)


SOLDER WASHER
2" DIA. HELY-ARCS
MOTOR MOUNTS 3/8 x 1/2 BASS
FUEL TANK
CUT OFF END TO CLEAR FUEL TANK.
BELL CRANK PIVOT POINT
MICRO-DIESEL ENGINE ROTATE INTAKE AS SHOWN.
J-BOLTS (3)
0° WING INCIDENCE
1/4 BALSA CUT TO FIT.
USE REGULAR NUT PLATES
1/8 DIA. MUSIC WIRE
3/8 x 1 BALSA
1/4 PLYWOOD
1/4 BALSA SHEET
LINE GUIDE 1/16 PLYWOOD ONE WING TIP ONLY
ONE INCH SQUARES
1/16 SHEET BALSA TOP ONLY
1/4 x 3/8 HARD BALSA
JACK Bayha 1948


COVER ENTIRE MODEL WITH SILKSPAN G-M
CLEAR DOPE 3 COATS. COLOR DOPE TO SUIT.
¼ x ½ BALSA CRUTCH
HORN REINF.
5/8 RUDDER OFFSET.
⅛ BALSA (HARD)
⅛ BALSA TOP AND BOTTOM
1/16 BALSA SIDE COVERING
SOLID BALSA
AT LEAST 30° UP AND 30° DOWN ELEVATOR TRAVEL.
COVER WITH GAUZE
1/16 MUSIC WIRE
RIBS MAY BE NOTCHED INTO TRAILING EDGE FOR ADDED STRENGTH
⅛ BALSA
THIS MODEL MUST BE KEPT LIGHT IN WEIGHT FOR TOP-NOTCH PERFORMANCE.....
GINGER SNAP!


NAVIGATION LIGHT - RED
WING SECTIONS
14'-6" DIA.
FRONT VIEW PROP
41'-1 7/8"
9'-5"
TO LEADING EDGE OF WING
RUDDER HINGE
FIXED TAB
TRIM TAB
IDENTIFICATION RADIO ANTENNA
NAV. LIGHT WHITE
COOLING FLAP
DECK ARRESTING GEAR
TAIL WHEEL DOORS
AERIAL TORPEDO
MAIN WHEEL IN RETRACTED POSITION
ALL METAL STABILIZER
20'-9"
DIVE FLAPS
20 M.M. CANNON
FOLDING BREAK
500 LB. BOMB SHOWN IN DOTTED
ALL METAL AILERON
METAL TRIM TAB
FIXED TAB
NAVIGATION LIGHT GREEN
FUSELAGE SECTIONS
CARBURATOR AIR INTAKE
PRATT & WHITNEY WASP "MAJOR" 3,000 H.P. RADIAL ENGINE
9° TIP DIH.
2° 30' DIH.
50'-0" WING SPAN
500 LB. BOMB
MAIN AIR INTAKE
T64 (5 INCH H.V.A.R.) ROCKETS
14'-4" THREAD
MARTIN AM-1
DRAWN BY- LEONARD WIECZOREK

DRAWN BY- LEONARD WIECZOREK

14'-4" THREAD

NAVIGATION LIGHT GREEN

1948

Martin AM-1

This will be a standard dive bomber for carrier use

by **ROBERT McLARREN**

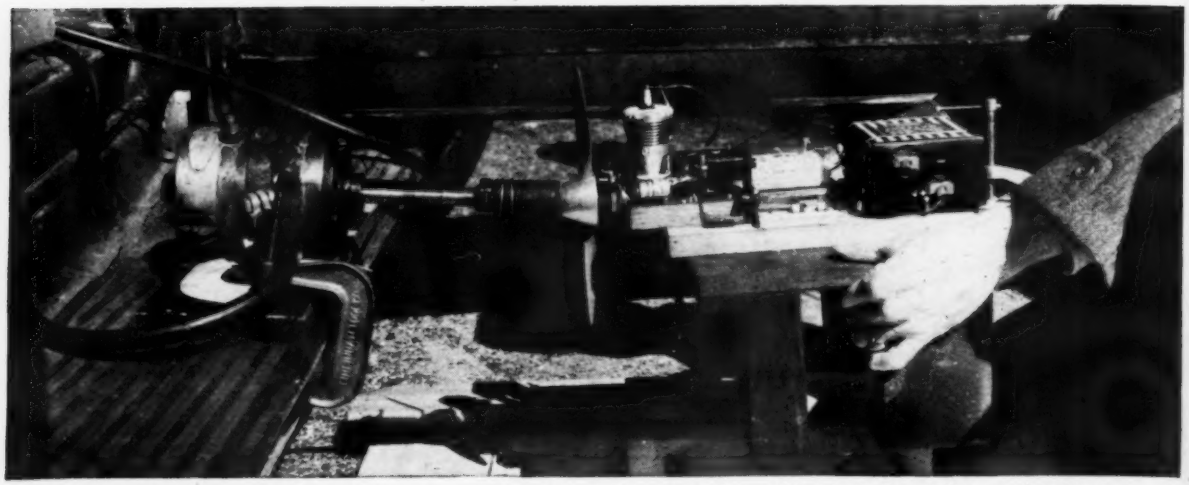
THE dive bomber is the Navy's "Sunday Punch" and there's a flotilla of Japanese ships resting on the bottom of the Pacific to prove it! And with Uncle Sam's latest dive bombers in action, those Jap ships will assuredly be joined in short order by any other vessels that fly the flag of a nation at war. For the dive bomber is the only 100% accurate method of knocking out a fast-maneuvering surface vessel.

What is dive bombing? Believe it or not that question is still debated in military clubs the world over, but the Navy Bureau of Aeronautics has one answer that wraps the whole argument up in a nutshell: "If you aren't diving *straight down*, then you aren't dive bombing!" No argument about degrees, angles of attack, approach patterns or time-velocity curves: either it's straight down, or it isn't!

There's a large segment of informed critics of dive bombing (most of it wearing Air Force wings) that submits the improved Norden bombsight—or other electronic devices—as the final argument against the hazards of dive bombing. But Naval dive bomber pilots answer this one with: "Brother, evidently you've never seen a Jap destroyer churning and squirming!" Obviously, regardless of the accuracy of a high-level bombsight and bomb release system, the target can move in any of 360 degrees at a speed up to 45 knots while that carefully preset bomb is falling through empty space. With the dive bomber pilot following every trick and turn from dead overhead, there are a few Jap skippers still alive to argue the accuracy of dive vs. horizontal, skip or glide bombing.

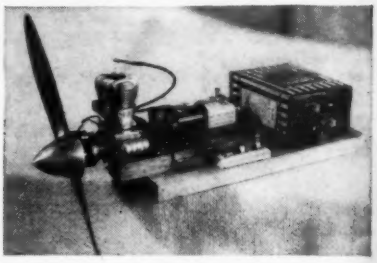
Dive bombing was created by the U.S. Navy in 1928, and the ensuing 20 years has seen no letup in its progress. First U.S. dive bomber to score in action was the Douglas SBD *Dauntless*, a group of which operated from Guadalcanal with devastating effectiveness against constant Jap naval attacks. Dive bombing reached the height of its history at the Battle of Midway when Curtiss *Helldivers* from the *U.S.S. Enter-* (*Turn to page* 36)

PLANE ON THE COVER STORY



Starter is clamped to car running board; heavy cables lead to battery and switch may be used if desired. (Below) Motor mounted for testing

Operation of "Hot" Engines



by EDWARD G. INGRAM

RACING ENGINES for model planes are designed especially to provide high power output for their weight and displacement—which means they must operate at a very high speed. Every engine design is a compromise in which certain sacrifices must be made to achieve a desired end-result.

When the objective is maximum power some sacrifice must be made with regard to ease of starting. To operate at speeds over 10,000 revolutions per minute an engine must have good "breathing ability" in order to get the fresh charge into the cylinder and the burnt charge out in an exceedingly short time interval, for at 10,000 rpm one stroke of the piston is completed in 3/1000 of a second. That is, the engine must have what the engineer calls high volumetric efficiency. Because of the inertia of the gas and the frictional resistance to gas flow, passages and ports must be made large. This causes the gas velocity past the carbureter jet to be abnormally low at hand-spinning speeds, so that little suction is created to draw in gasoline, a condition which is clearly revealed by the installation of a transparent plastic tube for the fuel line.

The engine may be started by choking, but unless it picks up enough speed to continue to draw in gasoline after the air intake has been uncovered it will soon stop. The condition is aggravated when the engine is new and therefore stiff, and also when a large heavy propeller is used which offers resistance to acceleration because of its inertia. Since it is desirable to use a large prop from the standpoint of holding down speed until the engine is broken in—and as you can't change props after the engine is running—we have a confliction of conditions, which is unfortunate.

There are other factors that tend to cause hard starting in racing engines. The disc-type rotary valve with which practically all such engines are equipped is purposely fitted to the crankcase with a clearance of from .001 in. to .002 in. to reduce drag and wear on the valve and its seat. Gas leakage at this point may be considerable at low speeds. Leakage can be detected by placing a finger over the air intake and moving the piston down with the plug removed from the cylinder. Air will blow out of the intake tube and there will be little resistance to movement of the piston; that is, little crankcase compression. (If the sparkplug is not removed when making the test there may be resistance to piston movement caused by another condition, which is deceptive. In engines which have not been broken in there is usually considerable leakage from the combustion chamber past the rings on the up-stroke, and the cylinder compression may be lost before the piston starts down. In this case a vacuum is formed in the combustion chamber when the piston is moved down which causes a resistance to piston movement that may be wrongly taken for crankcase compression.)

The port timing of racing engines is intended for high-speed operation and therefore is not favorable to easy starting.

For maximum efficiency at high speeds the capacity, or capacitance, of the condenser connected across the timer points of a racing engine should be low, about .03 mfd. or even .02 mfd., but for low speeds and easy starting a higher capacity is desirable. Unless means are provided for switching from one condenser to another—which is not usually practicable except possibly with test stand operation—a compromise in condenser capacity is necessary. One well known accessories manufacturer uses a capacity of .05 mfd. for all condensers. A well known engine manufacturer states that condensers with capacities ranging from .05 mfd. to .10 mfd. give the best all-around results. The design of the spark coil has a great deal to do with suitable condenser capacity. Some modelers use auto breaker point condensers, but their capacity is really too high, usually around .50 mfd.

With high grade electrical accessories and proper wiring, however, ignition considerations have relatively little to do with hard starting. It is true that with the high compression used in racing engines it is more difficult to make the spark jump the plug gap, but the usual battery voltage of 3 is sufficient for the purpose. Some high quality coils are capable of withstanding a battery voltage of 4 1/2 for short periods of time. An experiment with this voltage failed to indicate any material advantage in starting, although one manufacturer states that the higher voltage does sometimes help.

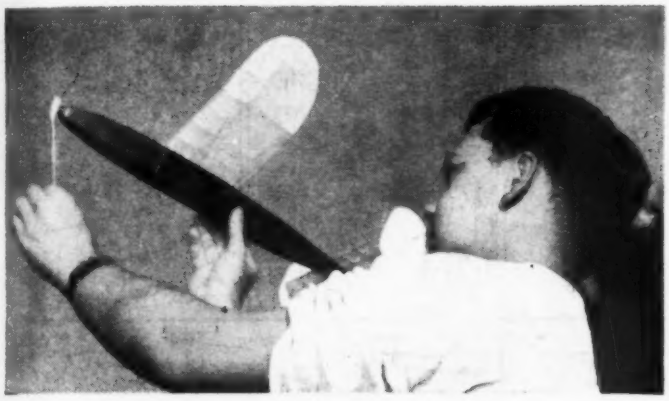
In view of the foregoing statements, at this point the reader will be justified in asking for the solution to the problem of starting racing engines, especially those that are stiff because they have not been fully run-in. The solution is the use of an electric or other form of power starter which is capable of spinning the engine at high speed. It is both unfortunate and surprising that no power starter for model engines has been placed on the market, so the modeler must improvise his own equipment.

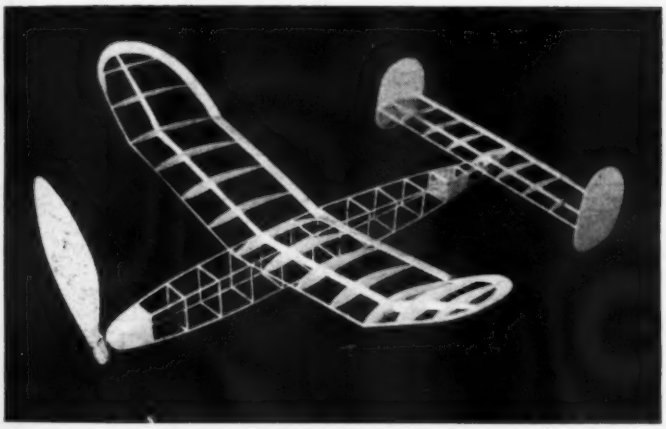
Various methods of construction have been developed. A common method is to secure a secondhand auto starting motor that turns in the correct direction, mount it on a suitable stand, and fasten a piece of rubber hose over the shaft for engagement with the spinner of the engine.

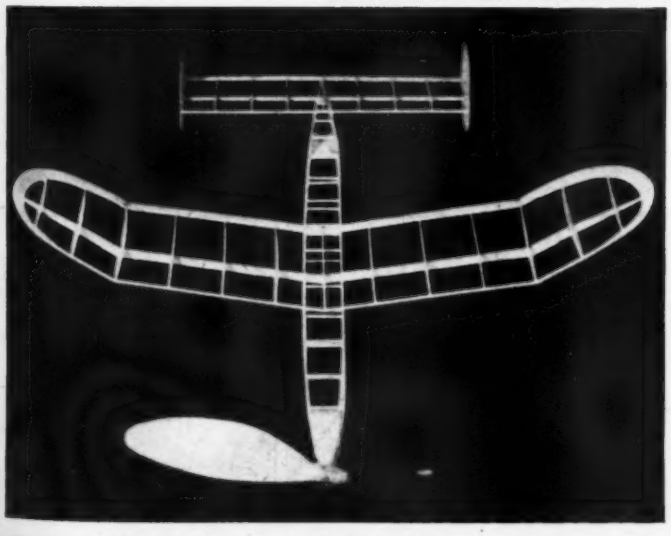
One engine manufacturer reports that tests of a starting motor taken from an old Willys automobile showed it was capable of turning a model engine at 4400 rpm, a speed which is ample for starting purposes. Such motors may be

(*Turn to page* 46)

HIGH Performance Sportster







by C. R. JOHNSON

THE credit for originating this type of model should go to Art Schultz, a buddy of mine, who wu, back in the summer of '41 built a model of about 50 sq. in. wing area which closely resembled a contest stick job. He built it on the theory that such a model would fly much better than the ordinary small "sport" job. Art could not go to the Nationals and since he thought he ought to be represented in some way, he threw the ship in my box, and we took it along. On the Sunday morning after the contest was over (during the meet we had three fruitless days of thermal hunting), we took the model out and lost it on a 6 minute O.O.S. flight.

We had so much fun with this job that I designed and built the present model. At first we thought the local ball park would be large enough for it, but after climbing every tree in the neighborhood the idea was given up as unsound.

The design is basically the same one we have been using for years. A large prop is used with a comparatively long powerful motor. This gives a long motor run with a high rate of climb. The first good day the model was flown it turned in several flights of 2 to 3 minutes. Then we hit a real one, and the model went 10:45 O.O.S.

Here's how to build this model which will give you almost contest type performance at practically no expense.

FUSELAGE: The fuselage should be built from 1/16" sq. rock hard balsa. The two sides are built directly over the plan; after they are thoroughly dry, remove and glue in the cross pieces. The 1/16" sheet soft balsa fillins are fitted and glued into place. The hole is drilled for the 1/8" dowel which acts as the rear hook, then the whole body is carefully sanded to remove bumps.

WING: Since only half the wing is shown on the plans it will be necessary either to draw up the other half or to oil the plan to make it translucent. As the first method allows the wing to be built in one piece it is the method the author recommends. It can easily be done by tracing over 1/2 shown, on tracing paper, then turning the paper over so the tracing becomes the left half of the wing.

The wing ribs are cut from 1/16" or 3/64" medium quarter-grained balsa. Only one size rib is shown on the plans; the tip ribs are cut down from it to fit. The trailing edge, spar, and tips are cut from 1/16" medium balsa. The spar is pinned down, and the ribs are glued in place (with the exception of the ones at the dihedral breaks).

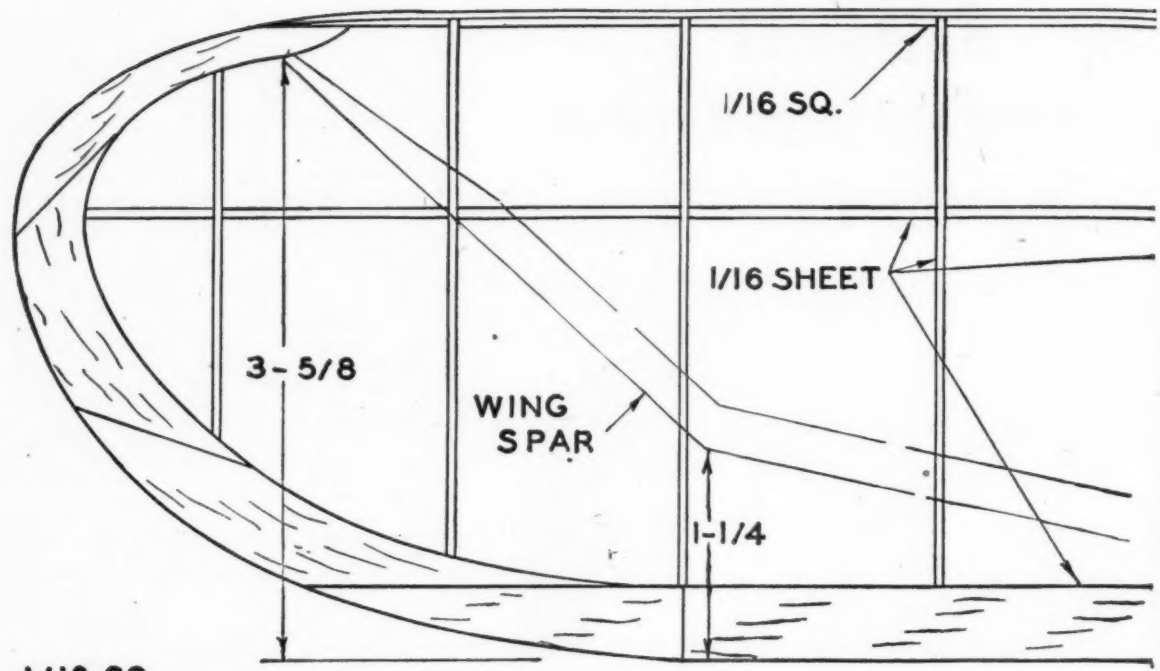
The trailing and leading edges and tips are glued on; and after the whole wing is dry the spar, leading edge and trailing edge are nicked and the correct dihedral thoroughly glued in. The trailing edge and tips are now tapered and the leading edge rounded off. A careful sanding is given the whole wing to remove bumps.

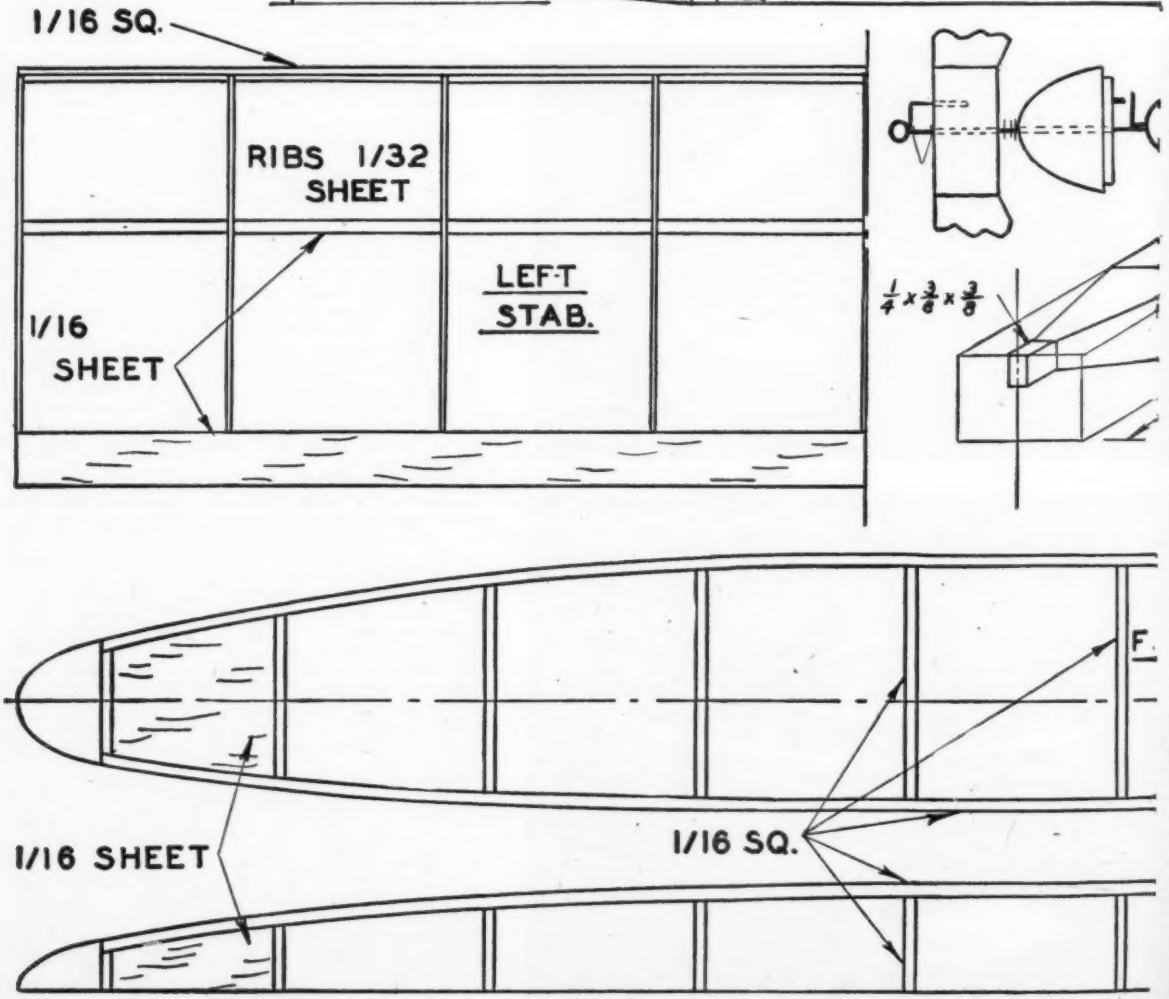
TAIL ASSEMBLY: The stab is built in the same manner as the wing. The twin rudders are cut from 1/32" quarter-grained balsa sheet and are sanded to a streamlined shape. They should carefully be given a couple of coats of dope to prevent warping.

PROP. ASSEMBLY: The prop is carved from a medium, soft block of balsa 9" x 1 1/2" x 1" cut out as shown on the plans. After the prop has been carved, sanded and doped, the builder may add his favorite folding device (the author used a Korda type hinge). The nose block is carved from hard balsa and a 1/16" pine sheet is used for the back. The prop shaft is bent from 0.040" piano wire, and a small spring and the stop on the back of the nose block are added. Tubing should be used on the hook to protect the rubber motor.

ASSEMBLY: After the ship has been covered with some bright tissue (red, orange, black and yellow, etc.) and has been tightened by water spraying, it is given two coats of dope. The rudders are glued on the stabilizer and the stab on the fuselage. Check to see this is at zero degrees. The wing is given about 3/32" incidence by a block glued under the spar and is held on by a loop of 1/8" flat rubber. Four strands of 1/4" flat brown rubber, at least 6" longer than the fuselage, are used for power.

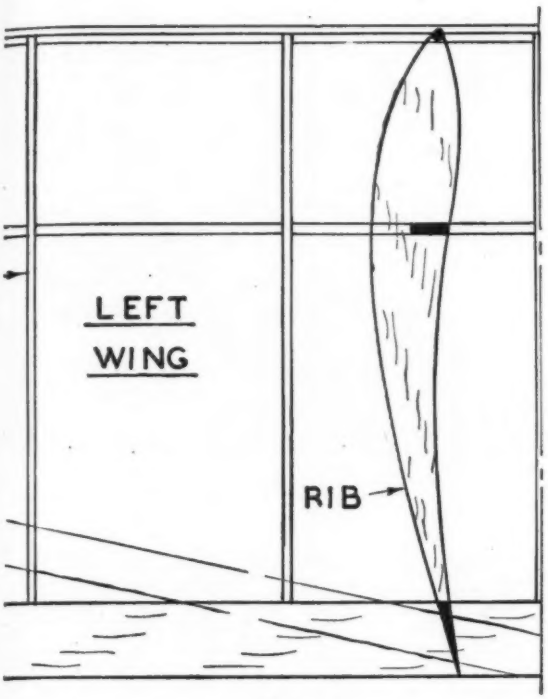
(*Turn to page* 38)

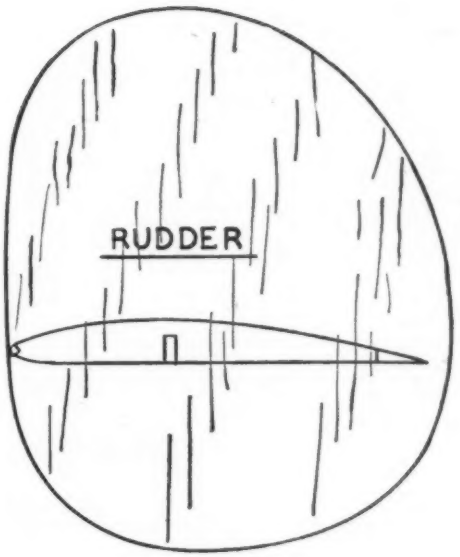

1/16 SQ.
1/16 SHEET
3-5/8
WING SPAR
1-1/4


1/16 SQ.
RIBS 1/32 SHEET
1/16 SHEET
LEFT STAB.
$\frac{1}{4} \times \frac{3}{8} \times \frac{3}{8}$

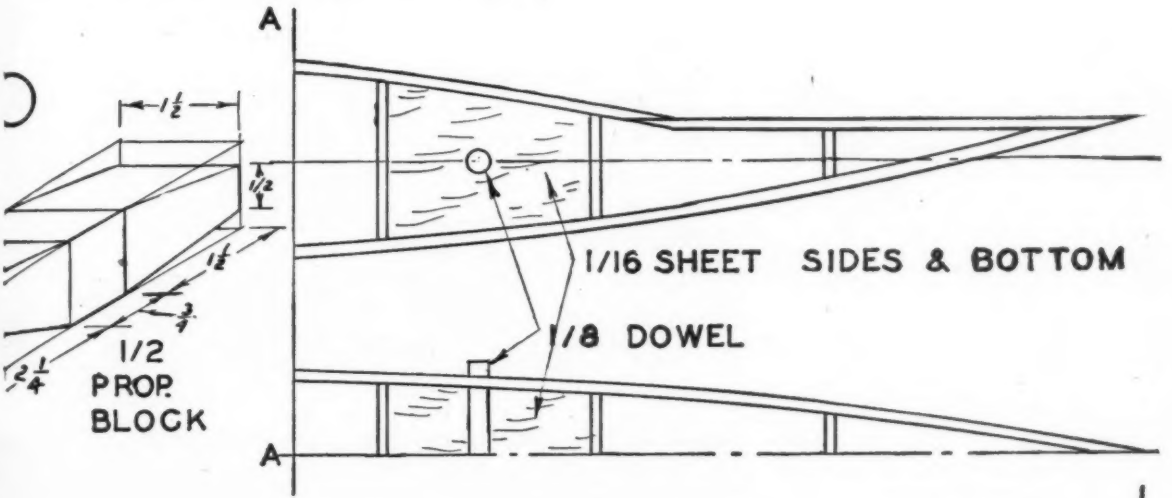
1/16 SHEET
1/16 SQ.

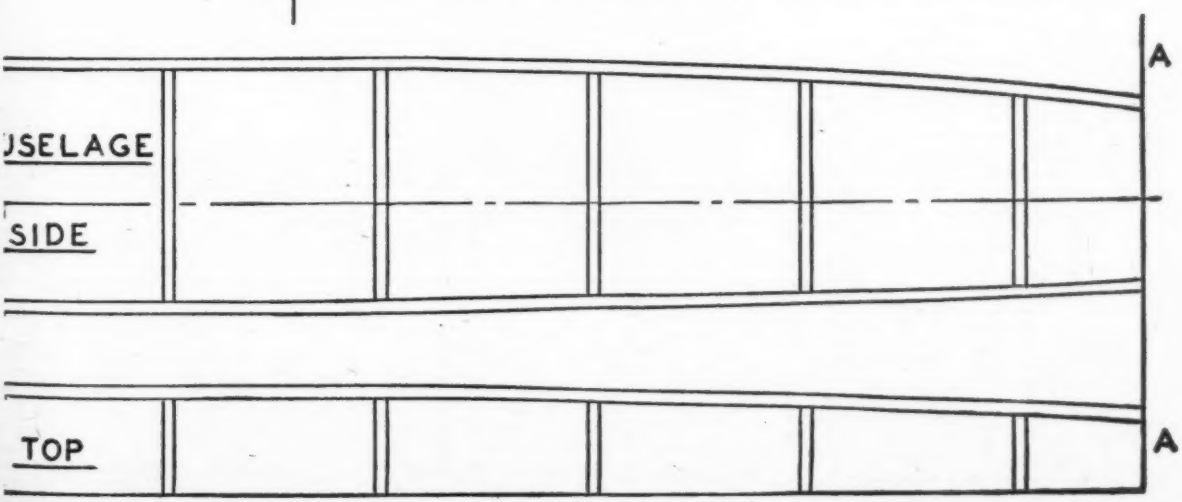
G.R.J.

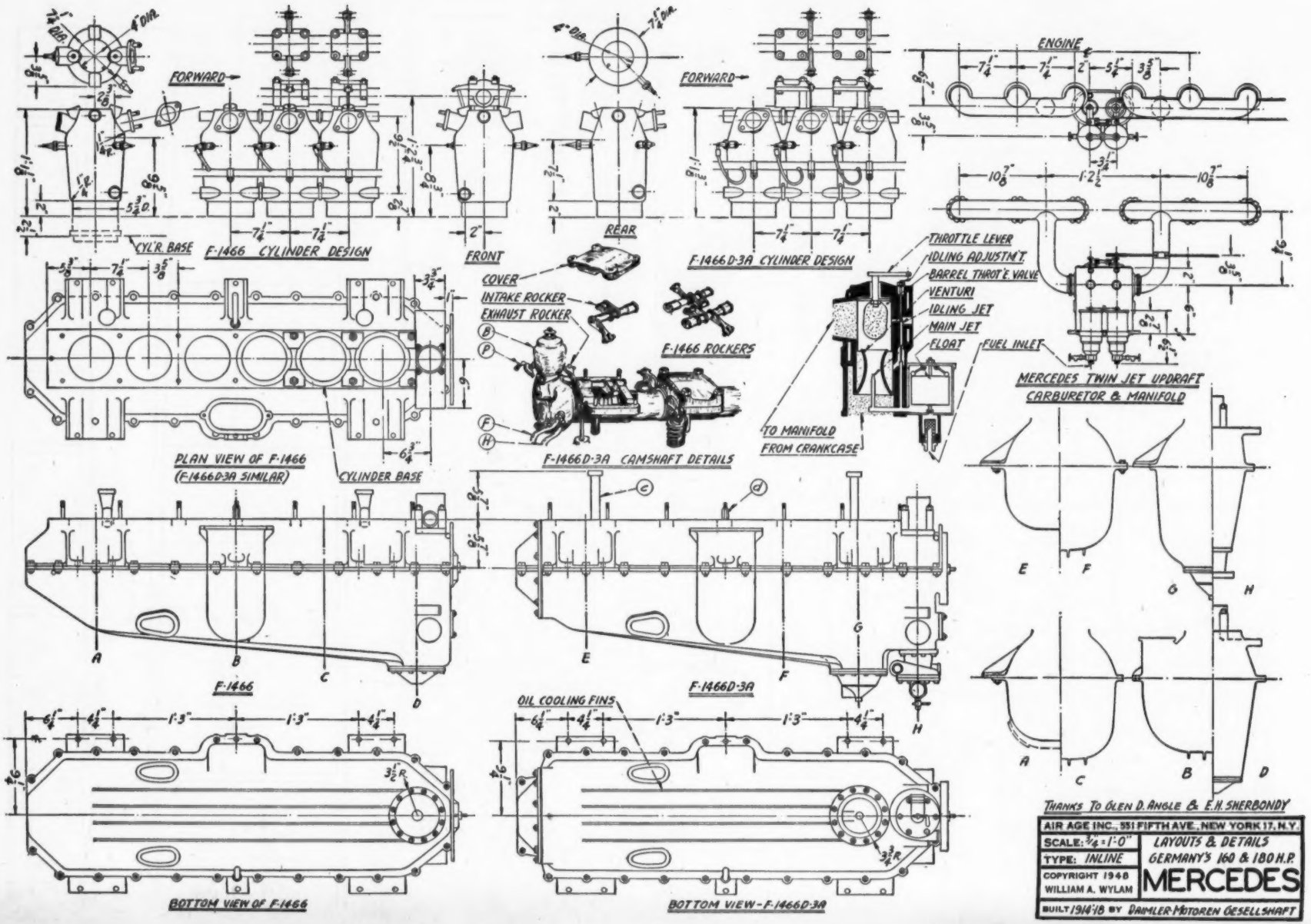




1/32 SHEET







Thanks To Glen D. Angle & E.H. Sherbondy

AIR AGE INC., 551 FIFTH AVE., NEW YORK 17, N.Y.

SCALE: 3/4" = 1'-0"

TYPE: INLINE

COPYRIGHT 1948 WILLIAM A. WYLAM

LAYOUTS & DETAILS GERMANY'S 160 & 180 H.P.

MERCEDES

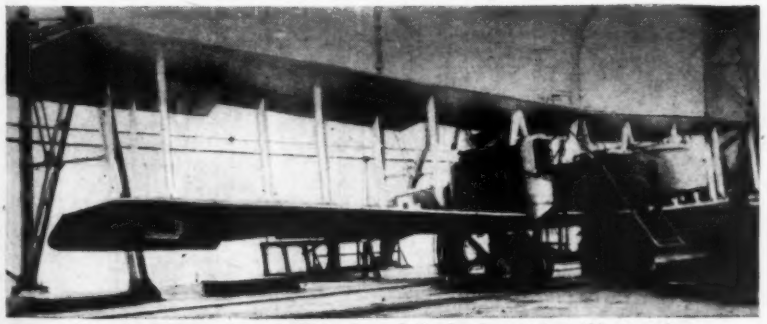
BUILT 1914-'18 BY DAIMLER-MOTOREN GESELLSHAFT

This Albatros C.V was flown with a Mercedes D IV, 8-cylinder geared engine

WORLD WAR I

by ***ROBERT C. HARE***

Captured Albatros C.I, used early in war, employed Mercedes D II and D III powerplants



Mercedes D IVa engines of 260 hp drove Gotha bombers such as this example

Part II

LAST month we gave a description of the Mercedes D III engine. This engine—which at one time or another powered almost all but the late German pursuits, and a great many early two seaters—was the most widely manufactured W.W.I. German aircraft powerplant. In all 11,750 Mercedes D III and D IIIa types were produced.

While the original D III created an enviable record for itself, Daimler engineers were quick to add refinements. These were principally small detail changes, but they added up to an engine somewhat superior to the basic D III. This new model was called the D IIIa.

The D IIIa possessed the same bore and stroke as the basic type, but its compression ratio was increased to 4.64:1. It was rated at 174 hp at 1400 rpm, although at 1500 rpm the output was 188 hp, and at 1700 rpm, 197.5 hp was developed. For all practical purposes, it was referred to by the Germans as the 180 hp Mercedes.

Cylinders, pistons, rods, crankshaft and camshaft were basically the same as in the D III. The valve operating gear, however, consisted of machined steel forgings. Camshaft casing covers were malleable iron castings which were reamed to form the top portion of the rocker spindle bearings. Since the rocker spindles were hollow and equipped with oil holes, the felt packed slots in the D III camshaft casings were no longer necessary. Valve lift in the D IIIa engine was increased to 0.452 in.

D IIIa carburetion was identical to that of the D III model. The new engine was equipped with a larger oil pump for pressure feed of engine parts through 3 separate channels. Magnetos, plugs and timing were identical to those of the earlier model. A new water pump, driven from a takeoff at bottom of the vertical camshaft drive, was equipped with a screw-down grease lubricator operated from the pilot's cockpit.

B.M.E.P. of the D IIIa was 109 lbs. per sq. in.; fuel consumption (at 1400 rpm) was 0.545 pt. per B.H.P./hr. oil consumption per B.H.P./hr was 0.042 pt.

High Compression D IIIa

A further advance in the basic Mercedes D III engine was the introduction, early in 1918, of a high compression model. It is obvious from this design that Daimler engineers were squeezing every ounce of power possible from the basic D III, and their last effort was a 200 hp rated model which delivered 204 hp at 1600 rpm.

Pistons in the 200 hp type were constructed in the same manner as those in earlier D III engines, except the crowns were domed instead of concave as in the 160 and 180 hp models. Thus the compression ratio was increased to 5.73:1 in the 200 hp job, roughly 23% greater than in the 180 hp type. Standard rods, crankshaft, camshaft and valve gear were fitted.

The 200 hp model, in addition, was fitted with an altitude control. This ingenious little device was a forerunner of a high altitude supercharger. It permitted German pursuits fitted with such a carburetor to develop a much higher percentage of power at altitude, where they were better able to cope with Allied fighters equipped with engines of higher sea level ratings than the Mercedes.

The carburetor with which the 200 hp Mercedes was equipped was standard, except for the throttle barrel. The barrel was modified to accommodate the altitude control. This device consisted of two extensions on the bottom of each barrel. Slots were cut in a sliding air valve to match extensions on the throttle control. The throttle control lever was marked for opening to its maximum ground level position. At all throttle openings up to this mark, the lift of the sliding air valve was restricted because it came into contact with the extensions on the throttle barrel. As soon as the throttle was opened past the mark on the control lever, the extensions on the throttle barrel came into line with the slots in the sliding air valve. This action allowed the air valve to lift to its maximum position and uncover extra air holes. The additional air taken in weakened the full throttle mixture at high altitudes to permit a higher output of power, but on the ground it weakened the mixture to the extent that

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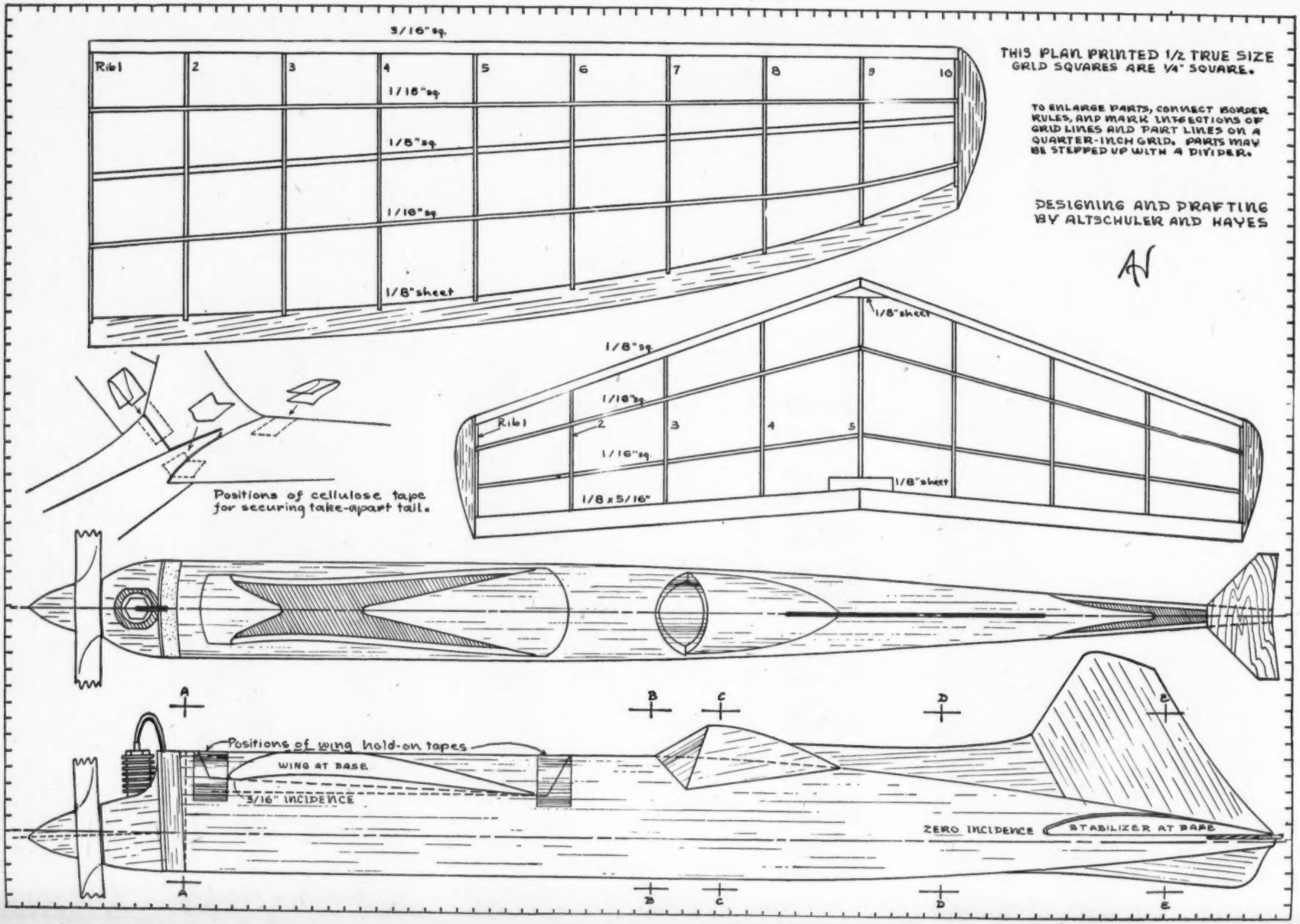
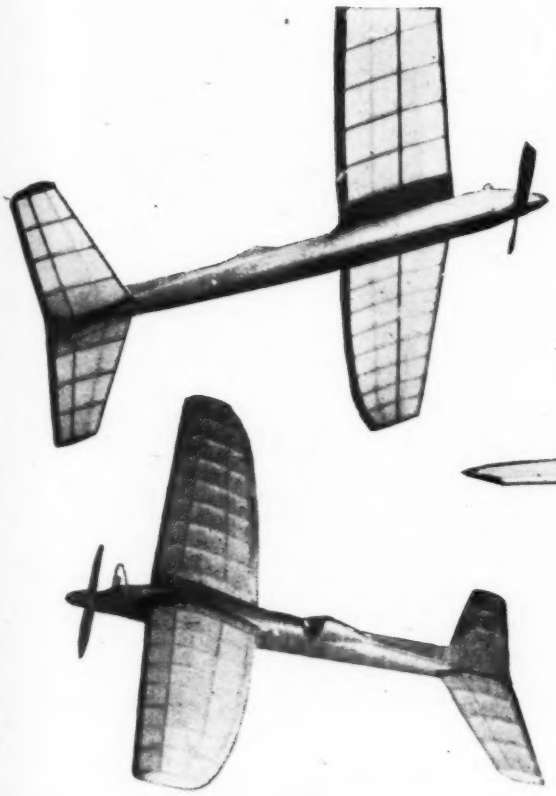
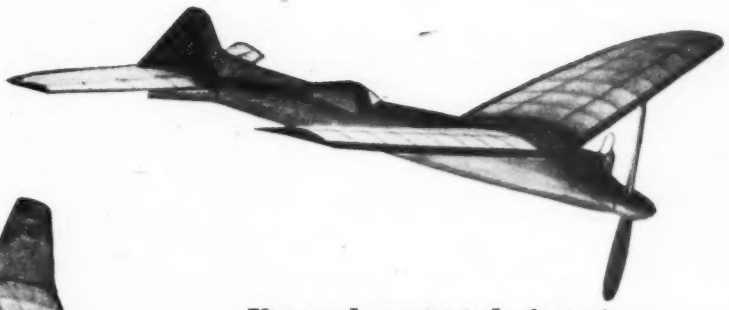

3/16"sq.
Rib1
2
3
4
5
6
7
8
9
10
1/16"sq.
1/8"sq.
1/16"sq.
1/8"sheet
THIS PLAN PRINTED 1/2 TRUE SIZE
GRID SQUARES ARE 1/4" SQUARE.
TO ENLARGE PARTS, CONNECT BORDER RULES, AND MARK INTERSECTIONS OF GRID LINES AND PART LINES ON A QUARTER-INCH GRID. PARTS MAY BE STEPPED UP WITH A DIVIDER.
DESIGNING AND DRAFTING BY ALTSCHULER AND HAYES
AV
1/8"sheet
1/8"sq.
1/16"sq.
Rib1
2
3
4
5
1/16"sq.
1/8"sheet
1/8 x 5/16"
Positions of cellulose tape for securing take-apart tail.
A
B
C
D
E
Positions of wing hold-on tapes
WING AT BASE
3/16" INCIDENCE
ZERO INCIDENCE
STABILIZER AT BASE



Slick

by J. Altshuler & F. Hayes



Unusual contest design gives fine results with CO2 power

WE think that ability to use new ideas, when they offer promise, is one of the marks of a good modeller. The continual testing of all "new fangled" ideas is part of progress in modelling as in anything else. Therefore *Slick* is composed of many things gleaned from the model mags, club talk, the things we learned about CO2 on our own hook, some ideas "lifted" from CO2 kit models, and all the corner-cutting that comes from years of modelling. We think you'll be just as pleased with it as we are, and will be taking it to the next contest with high hopes.

While investigating new motors we decided the CO2 deserved a real try. Rubber models were found to fly well with it, but it cried out for something tailored to fit—namely, a streamlined model that would not waste its power in overcoming drag. Something fairly small that could easily be tugged upward to the height that would give its low wing loading a real chance to show off. Several models were made, but the real answer was not found until *Slick* was built.

This model is very fast for free flight but has a low sinking speed and holds altitude with the best. Its climb can be sensational depending on motor adjustment, kind of prop used, and also, we found, on the temperature which greatly affects the rate of expansion of the CO2 gas that drives this motor. The hotter the day the better flights.

The one radical departure from regular modelling in *Slick* is the idea of carving out the fuselage from solid balsa and hollowing it, not a new idea by itself but when used for free flight it is still something of a novelty. If used for gas models, balsa shell fuselages will give you a rough time, and a lot of money gone into shavings. For rubber it isn't quite the thing either, mainly because it doesn't let you know what's going on inside. But for CO2 models it offers real advantages. A few cents more for material, but plenty of streamlining, looks and fun, plus possibility for a fine finish. In case you're wondering about the weight, we'll say here and now that the ship is light, weighing 4-1/2 oz., and is rugged plus.

Landing gear has been left off in favor of an arrangement that allows the entire motor to give a bit in a crackup, or in case you forgot to tighten on the prop so that it stops in a horizontal position.

Finally, not able to resist that temptation to add a little flash, we swept back the stabilizer and rudder.

The small enclosed cabin is there for the purpose of housing a pneumatic timer to operate a rudder-tab type dethermalizer. It is not absolutely necessary, and is not described here, but you will probably want one of these for *Slick*. Performance figures of the original model indicate one is called for if you want to avoid those thrilling but chilling O.O.S. flights. You will agree when you consult the honest-to-goodness three flight average of 4 min. 11 sec. We doubt that thermals had a hand in this, as all other flights under similar conditions are very close to this time.

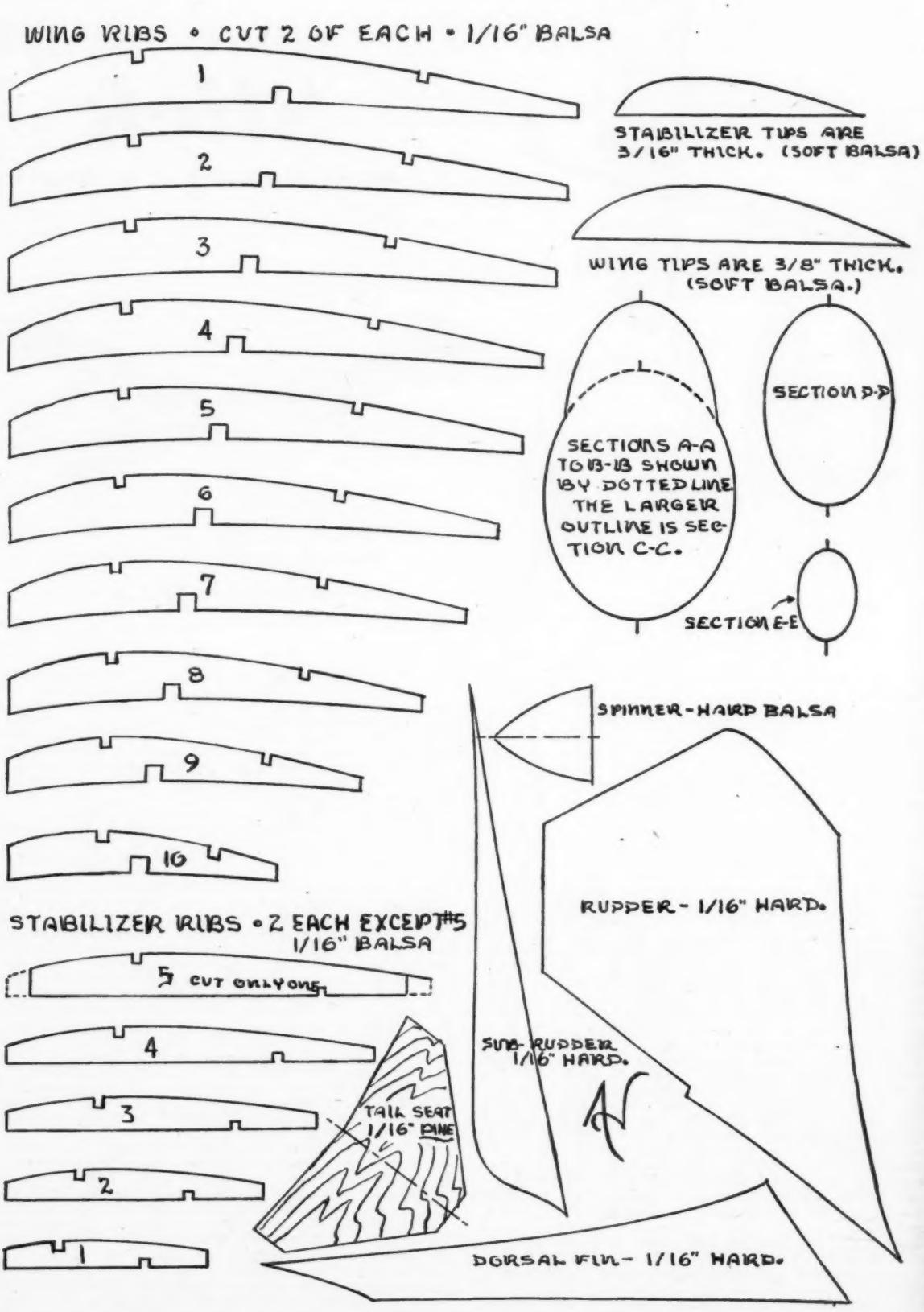
Heat affects CO2 performance, as everybody knows by now —expanding the carbon dioxide gas to greater volume, giving more (or faster) propeller revolutions per capsule used. If you're out to break a record, wait for a hot day. *Don't heat the capsule!*

Since CO2 models are now being officially flown against each other only, this shouldn't bother the contest flyer too much as regards winning an individual contest. But where national duration records are concerned, a sliding temperature scale, computed on the exact degree of heat expansion of carbon dioxide gas is only fair. This would reduce all times to a common denominator of temperature equivalent before being officially reckoned. How about this, AMA Rules Committee?

Enough for the why's and wherefores. A little information about props and we'll go into actual building. The CO2 props we found in the hobby stores are mainly 3″ pitch and 7″ or 8″ diam. They will work very well and the hand carved prop used on the first few flights, with square tips—in keeping with the design of the wing and stabilizer—was not enough of an improvement to include directions for making it. A recent CO2 prop on the market is 8″ diam. 4″ pitch, and this is the one we recommend because the clean lines of *Slick* allow a higher pitch for less thrust and more speed than average, and we noticed a general 10% improvement in duration when it was used, showing up mainly in the rate-of-climb. A folding prop was originally planned, but the regular type of rubber folder was found to be weak, and lost the correct blade pitch under pressure of the 8000 rpm the OK CO2 motor can give. So if any of you enterprising builders think you have the answer, here's the ship to try it on.

First, enlarge the wing and fuselage to twice size. Just draw up one wing, as the other is traced over it, on transparent paper so it can be turned over for the left wing. If you make a template from balsa or cardboard, of the curve of the

(*Turn to page* 44)


WING RIBS • CUT 2 OF EACH • 1/16" BALSA
1
2
3
4
5
6
7
8
9
10
STABILIZER TIPS ARE 3/16" THICK. (SOFT BALSA)
WING TIPS ARE 3/8" THICK. (SOFT BALSA.)
SECTIONS A-A TO B-B SHOWN BY DOTTED LINE THE LARGER OUTLINE IS SECTION C-C.
SECTION D-D
SECTION E-E
SPINNER - HARD BALSA
RUDDER - 1/16" HARD.
SUB-RUDDER 1/16" HARD.
DORSAL FIN - 1/16" HARD.
TAIL SEAT 1/16" PINE
STABILIZER RIBS • 2 EACH EXCEPT #5 1/16" BALSA
5 CUT ONLY ONE
4
3
2
1

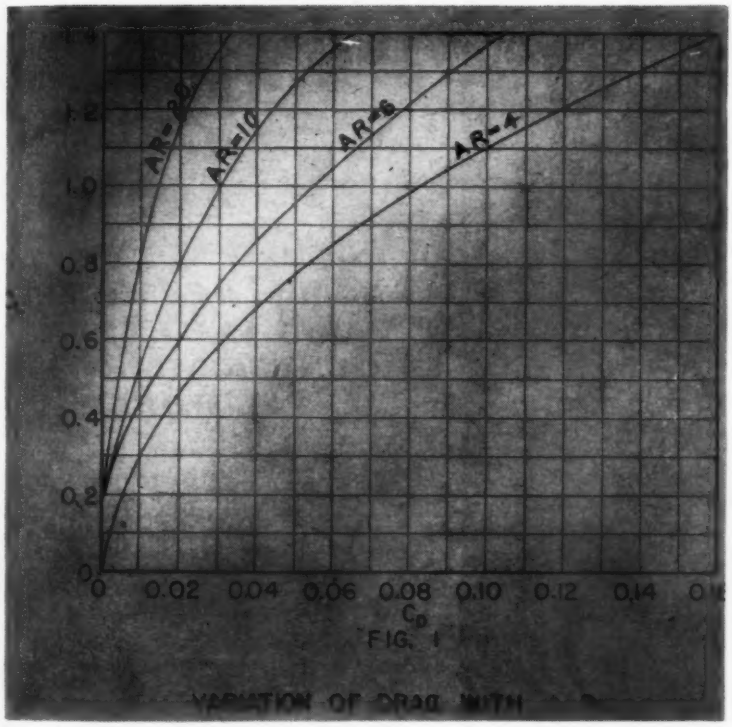


FIG. 1

VARIATION OF DRAG WITH

Theory of Aspect Ratio

by GEORGE H. TWENEY

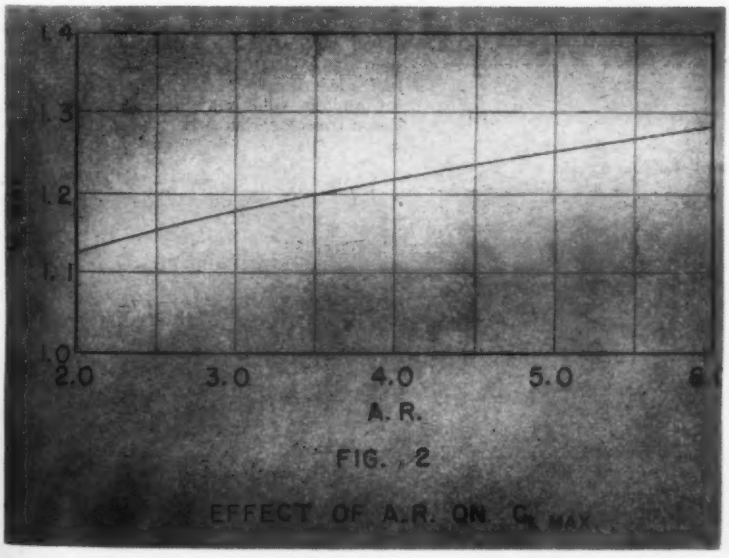


FIG. 2

EFFECT OF A.R. ON $C_{L\ MAX.}$

THE ratio of span to chord of an airfoil is called the Aspect Ratio, and this is a very important factor in the design and performance of airplanes. It is, of course, always greater than unity because the airplane wing works most efficiently when shaped to present its longest dimension perpendicular to the direction of motion.

The importance of aspect ration from an aerodynamic standpoint is apparent from a consideration of what is happening at the tips of an airfoil moving through the air. Since pressure of the air below the wing is greater than that of the atmosphere, and that of the air above the wing less than atmospheric, there is a constant tendency for the air to flow around the end of the wing from lower to upper surface. This flow sets up vortices, or eddies, at the wing tip. In the production of these eddies a considerable increase in drag is involved, because a definite amount of energy is required to set the air whirling, and this energy must be added to that required to drive the wing through the air. Since the eddies are torn off the wing by forward motion as rapidly as they are formed, their energy is entirely lost, for they die out behind the wing on account of the internal air friction. As every wing must obviously have at least two tips, there is no way of avoiding this tip loss entirely; the next best thing is to have as little tip as possible in proportion to the wing area. This is accomplished by making the aspect ratio high—that is, by making the span of the wing great in proportion to its chord.

In the following analysis of aspect ratio, these symbols are used:

AR: Aspect Ratio.
b: Wing Span.
S: Wing Area.
c_m: Mean Chord of the Wing.

From definition, we can state:

$$AR = b/c_m$$

from which $c_m = b/AR$

Also: $c_m = S/b$

From these two equations:

$$S/B = b/AR$$

Therefore: $Ar = b^2/C = b/c_m$

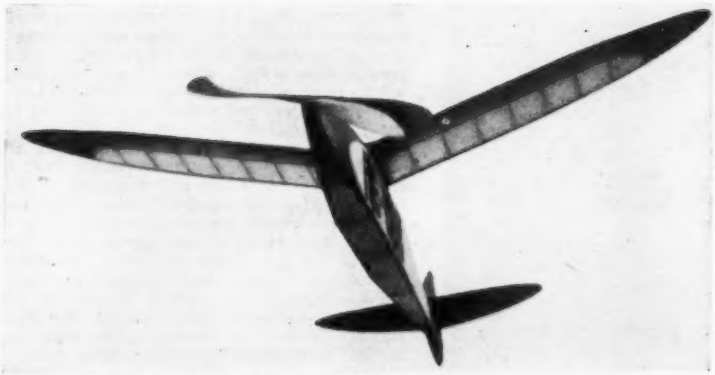
By means of either of these two equations, the aspect ratio of a straight or tapered wing may be accurately computed. The two equations obviously give identical results for square-tipped wings of constant chord.

The effect of aspect ratio on the drag of an airplane wing has already been discussed, and is more clearly shown in Fig. 1. This is a graph that shows the variation of induced drag with aspect ratio. It is interesting to note how much the induced drag coefficient is reduced as the aspect ratio is increased, and as the higher lift coefficients are reached. This is very important where model airplanes are concerned since they usually fly at relatively high lift coefficients and low speeds, so that any drag reductions become quite favorable.

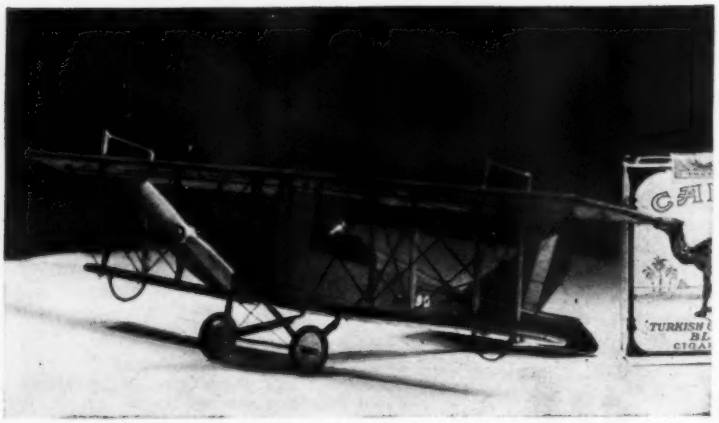
The effect of aspect ratio on the lift of a wing is shown by the graph in Fig. 2. It is seen that the effect on lift is not as pronounced as the effect on drag. However, the lift is increased as the aspect ratio is increased, so that the effect is again in favor of the model.

It is a well known aerodynamic fact that for best all-round efficiency an airplane should fly at the best L/D value, which theoretically is the highest value. In commercial practice this is practically impossible since large airplanes achieve their best control, and best engine-propeller efficiency, at a value below the optimum L/D ratio. But for model airplanes, particularly long endurance indoor ships, the reverse is true. We adjust our models so that they fly at the highest possible lift coefficient, and we build them so the drag will be an absolute

(*Turn to page* 35)

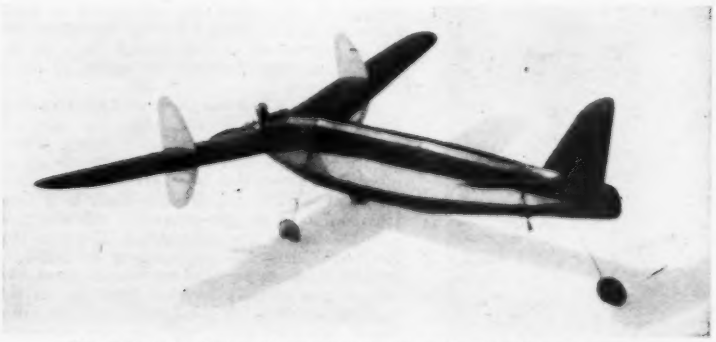


No. 1 Rubber job of Michael McAllister in flight over the rooftops



No. 2 Tiny scale *Jenny* built by C. B. McKennon has full set of controls

No. 3 Richard Perry holds his Class D stick model ready for a flight



No. 4 First of a Series of canards designed and built by Kermit Hanson

AIR WAYS

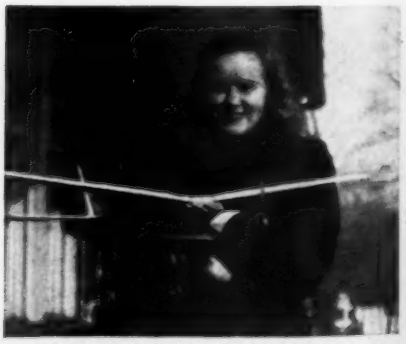
NEWS OF MODEL AIRPLANE EXPERIMENTERS ALL OVER THE WORLD

PAA-LOAD EVENT. We are glad to announce that a last minute decision by Pan American World Airways to sponsor a series of Payload contests for model aircraft has just been made public. Since Pan American is in the business of carrying payload in their worldwide airlines, they wish to encourage this sort of work in the model field.

Here, we feel, is an answer to those critics of present day free flight contest flying, who decry the screaming vertical climb of lightly loaded ships (*still* possible under 1948 rules) and the constant search for a lucky thermal. First running of the PAA-Load Event will be at the '48 Nationals and will follow in general the established AMA free flight rules with necessary exceptions. Entrants will be limited to combined Junior-Senior Classes (under 21 years of age) and models must be *Class B and ROG*. Scoring will be the longest of 3 official flights.

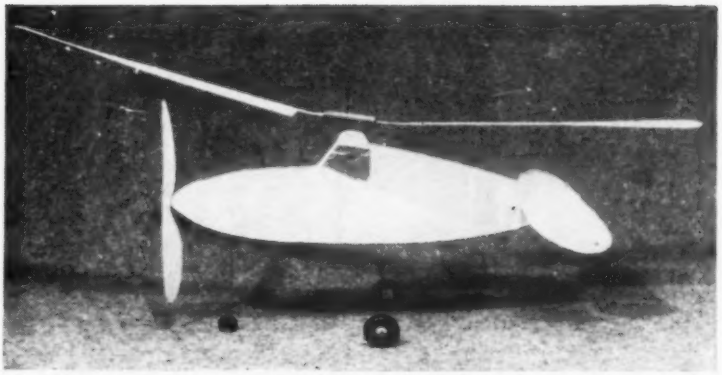
Payload will be in the form of "occupants" of a certain size and prescribed weight, which the flyer can easily make himself, and a compartment must be built into the model to hold these occupants. Each occupant must weigh 8 oz. and 2 must be carried in the ship. Certain seating rules have been established so that maximum realism will be had. From the way the rules are worked out, it appears it will be necessary to build a special ship for this event, or to modify an existing one, since the occupants can't just be slung under the fuselage—they must be seated in a prescribed manner with windows for them to look through! Yes, realism is the aim of this event, and in view of the fine prizes that have been established (1st place winner gets prize of $500 value and there are many others) we feel sure there will be many entrants.

Complete rules may be had from: Educational Director, Pan American World Airways,



No. 5 Shirley Sanders with her CO2 ship

No. 6 Curtiss F9C-2 *Sparrowhawk* by R. G. May



No. 7 Very successful autogiro built in England by Albert Hatfull and Arthur Roberts

2819 Bridge Plaza North, Long Island City 1, N.Y.

CLUB FLIERS often paint their club name and insignia on their ships, thereby assuring valuable publicity for their group, especially when the model is flown in neighboring cities. It is a great timesaver if decals of the club insignia are available but some clubs have been unable to locate a source for these needed items. The *Buffalo Bisons* would be glad to advise other clubs of reliable sources for such decals. Norris Maltby of the *Bisons* writes that his group also have a set of silk screens with which they can duplicate the club insignia on coveralls or T-shirts. We suggest interested individuals or clubs write Mr. Maltby at 95 Mariemont Ave., Buffalo, N.Y. for full information on these attention-getting items.

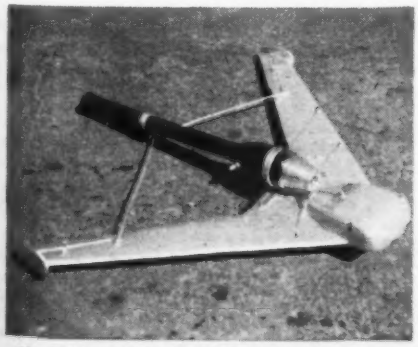
FLYING SCALE MODELLING seems to be coming back with a bang. Many contests are including events in this class, one of these being the Connecticut Indoor Model Airplane Contest conducted by *Model Aero Engineers* of Hartford. No weight requirement was included, but maximum span was 30" and all components of the models had to be within 1/8" of true scale, except the propeller. Other rules called for double surface covering of wings and tail, at least one coat of dope on the entire ship, and a wing airfoil section at least 70% as thick as on the prototype.

Scoring was by point system, with AMA indoor rules prevailing. The points were broken up as follows: Fidelity to scale 30; workmanship 30; details 40. In addition, one point per second of flight was awarded for the best of three flights (R.O.G. mandatory). We hope there will be many more such contests both indoor and out during the present season.

(*Turn to page* 49)

No. 8 Plans in M.A.N. enabled Dick Osterman to build this fine model of *Swee' Pea*

No. 9 Beautiful *Sea-Bee* of Fred Davis has proven to be an outstanding flier



No. 11 Unusual jet design by Harold W. Pierpont

No. 10 This model, built by B. Bland in Trinidad has made several O.O.S. flights

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Now Available through recognized dealers*

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AN ACCELERATED FUEL FOR GLOW PLUG OPERATION (quarts, pints)

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THE FUEL of CHAMPIONS

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Preview of the Nationals

(*Continued from page 12*)

Olathe is to the east of the wind belt which the boys experienced in Wichita in 1946. Calm days have been ordered and may reasonably be expected at this year's Nationals.

All Roads Lead To Olathe

The central location of Olathe gives a fair break to those who come by car as the geography plays no favorites of East against West. It is recommended that those from the East and Northeast cross Missouri on U.S. Highway 36 to Cameron, then come south on U.S. Highway 69 which runs along the outskirts of Kansas City and avoids the city traffic. From U.S. Highway 69, the way to Olathe will be on U.S. Highway 50 for about 20 miles. Those coming from the West will find U.S. Highways 40 and 50S the best roads across Kansas, and of course U.S. Highway 50S skirts the Olathe Naval Air Station.

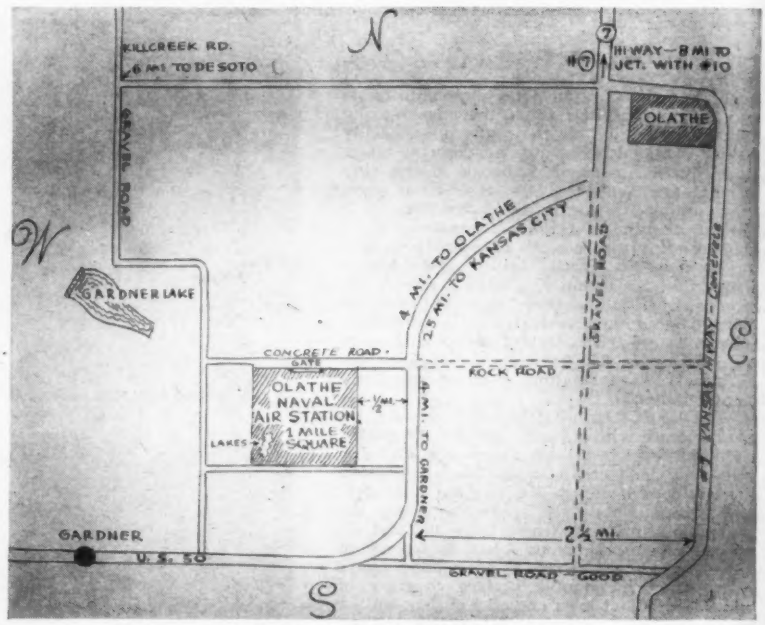
Visitors from the South may well come in on U.S. Highway 69 and turn west a little beyond the village of Stanley to cover the 8 miles into Olathe. Drivers from the North will find U.S. Highway 73 on the Kansas side and U.S. Highway 69 or 169 on the Missouri side good routes. The roads listed will be found fairly free of traffic and in good condition.

Thorough Advanced Planning

This year's Nationals received months of planning. A delegation from Olathe this winter traveled to Indianapolis to arrange general plans with the Legion and Frank Nekimken, who will be overall head man as Contest Supervisor. Frank, with his experience in running the Nationals in Chicago in 1940 and 1941 and at Minneapolis in 1947 is the ideal man for the general's position. He is leaving no stone unturned to make the 1948 Nationals a "contestants' meet."

Next in command are Dale Dorst, Secy. of the Olathe Chamber of Commerce, as Contest Manager and Lt. Com. Tex Witherspoon as Contest Promotion Manager. They are working like Trojans.

Each model category has a special contest director, an active modeler in the special classification. One of the devout controlers of Kansas City, L. L. Cook, will be contest director of control line. Brother Cook expects to have six flight circles and a practice circle, and says he will have every known fuel ingredient for the boys who mix their own. Also available will be props, batteries, and all hand and power tools needed for rebuilding work. Tom Wardlaw, also of K.C. and the designer of the KC Terror gas model, will be contest director for outdoor free flight. For indoor, there will be Jim McClelland of Wichita, contest director of the 1946 Nationals. Radio Control contestants will be happy to know that the director of radio at the 1946 Nationals and assistant in '47, June Pierce of St. Joseph, will be in charge of the red flag.



Trained Timers

When the contestant reaches the pit, the success of the Nationals depends on the competence of the timers. To insure real success, the Navy is furnishing an abundance of Navy personnel for the work. These boys will be trained in advance in the lecture room and on the circle and field where they will click the watches on actual flights. The sailors are reported to have excellent eyesight and to be able to easily distinguish a model from a bird. They have stamina and are accustomed to following directions and performing their duties conscientiously. An adequate supply of competent timers and officials in the last analysis makes a good contest, and on this score Olathe should equal the best.

Friendly Farmers

Dale Dorst, the Contest Manager, is a farm machinery dealer and is making arrangements with farmers for many miles around so there will be no grief with Farmer Brown, who will be as

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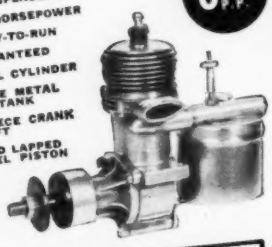

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- COMPLETE

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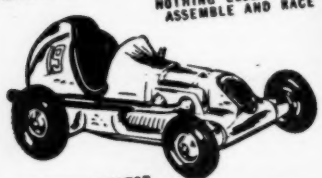

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MERCURY Model Airplane Co.
920-NB Utica Avenue, Brooklyn, N. Y.

interested as anyone in seeing that lost ships are returned to their owners. In return the contestants are asked only to be careful not to damage fences or tramp down crops.

Plans are underway for chasing models by airplane with a radio hook-up, and spotters will be stationed downwind. The prevailing breeze, if there is any, will probably be from the south, and the thermals may be expected to be active from 11 to 3 or 4. Early morning and late evening generally provide calm for testing.

A Sound Show Too

Arrangements are being made with Art Carroll, sound man of Topeka, to have his 3 sound trucks on duty. He hopes to arrange a hook-up with Navy mobile radio. There will be field telephones connecting all flight areas, officials and timers. Art knows his sound and is an experienced announcer at model meets. There will be up-to-the-minute reports on top speed, high time, etc. Leaders will speak to the crowd during lulls, and safety will be stressed by PA announcements. At *Mid-States* meets Art has at times boosted his volume and blasted the word over two miles distance, announcing that ships were recovered when the contestants were out searching.

Wakefield Eliminations

The 1948 American Wakefield team will be picked at the Olathe eliminations. Dick Korda, present record holder, is ex-officio a member of the team, and 5 other members plus an alternate or two will be picked to represent our country in this significant rubber model contest. The opening of the Wakefield after the war is an event that will please the enthusiastic rubber model builders. This historic event has long called forth the greatest skill of the model builder.

Special Events

Contestants with ROW ships will find two lakes, which the Navy uses for hydroplanes, at the southwest corner of the station; motor boats will be on hand. There will be a special CO2 event, and the radio control contest will open Thursday and run through Sunday. Control Line jet speed, and Mulvihill Rubber powered stick are also on the program.

SCHEDULE OF EVENTS

(*Tentative and subject to possible change*)

1948 National Model Airplane Meet
Olathe, Kansas

Wednesday, August 4

Registration at Olathe Naval Air Station, 8 a.m. to 10 p.m.
Control Line Speed, Class A
Free Flight Gas, Class D
Tow Line Glider
Radio Control Meeting, 7 p.m.
Contestants' Meeting, 8 p.m.

Thursday, August 5

Indoor Events at Kansas City, Mo. Municipal Auditorium
Indoor Hand-Launched Glider, 8 a.m. to 12 noon
Indoor Stick and Cabin, 12 noon to 6 p.m.
Outdoor Events at U. S. Naval Air Station, Olathe, Kans.
Radio Control
Control Line Stunt (All Classes)

Friday, August 6

Radio Control
Control Line Speed, Class B
Free Flight Gas, Class C
Stout Cabin (Rubber Powered)
CO_2 Powered Free Flight
AMA Executive Board Meeting, 8 p.m.

(*Turn to page 64*)

STANZEL'S *Easy-Built* MODELS
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WING SPAN 30"

These kits contain completely formed forward wing panels. All cowling, the fin, rudder, stabilizer and elevators are form cut to outline shape

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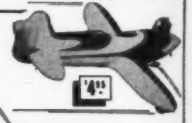

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Theory of Aspect Ratio

(*Continued from page 29*)

minimum. This qualifies the fact then, that our models fly at the highest possible L/D ratio. In the face of this fact, we should then incorporate in our model designs those aerodynamic effects which will tend to raise the lift and decrease the drag. The above discussed charts show how well a large aspect ratio achieves these results.

Aspect ratio also has a profound effect on the performance of an airplane. This effect can be shown to occur in the region of minimum power, which is exactly the condition in model airplane flight. An increase is aspect ratio will materially increase the initial rate of climb of an airplane, and this is something everyone is interested in with regard to models. It is often that favorable initial rate of climb which puts a model in reach of a favorable thermal with a resulting long flight. Approximately the same effect is noticed in the absolute ceiling of an airplane. Also, very high power loadings in a design magnify these results, and in some cases may even double the effect. This point is still more in favor of the model airplane.

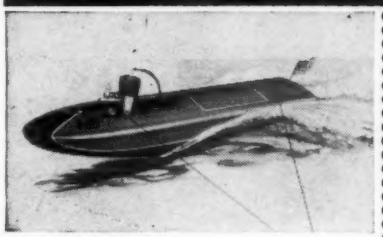
A series of tests were made by the author to corroborate the above theoretical deductions, on a Class B Indoor Tractor. These experiments were inspired by the statements of a large number of model builders that the effects of aspect ratio were reputably favorable, but the net effect was so small as not to justify the added structural and storage problems. Different wings of exactly the same area and planform were tried on the same model, using the same propeller and rubber characteristics. A marked increase in both rate of climb and ceiling was noted with an increase in aspect ratio. Changing the aspect ratio from 6 to 10 enabled the model to increase its ceiling from 75 to 95 feet, with the same number of turns on the motor; this, of course, gave a corresponding increase in the overall duration. Both these flights were made on the same day within one hour, so the atmospheric effects can be ignored.

When it was definitely established that the larger aspect ratio wing had such a favorable effect on the model's endurance, serious flights were made to determine the model's best time. These flights involved adjustment of the model to enable the maximum number of turns to be put on the motor without having the model lodge in the rafters; the best flight was 21 min. 33 sec. which definitely puts the model in the class of the record holders. It is regretted that these flights were all unofficial, so that official proof of the times can not be offered. It will be noted that these very favorable times were made on a model with only 100 sq. in. wing area, so that an even more favorable increase may be expected in the Class A category. These are some of the experiments the author is now conducting.

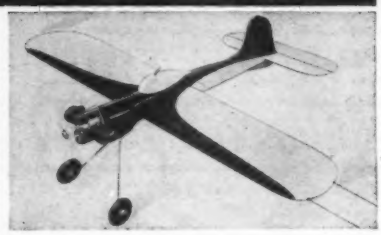
It is admitted that the structural problems involved in the higher aspect ratio wings are more difficult, but they can be solved by a more judicious choice of materials and improved airfoil section characteristics. Flapping tendencies in some of the wings used in the tests were noted, but these were eliminated by careful balancing of the model and rearrangement of the braces in the wing structure. In no case was the vibration enough to throw the model out of flight control.

The author believes that any further

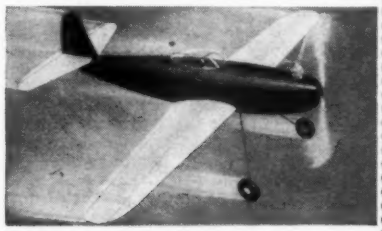
SCIENTIFIC MODELS



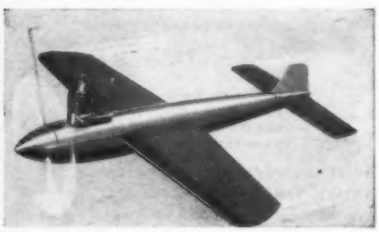
NEW! "BUCKEYE" Speedboat with carved hull. Class "E," length 17", beam 5¼", weight 2 lbs. for engines of .099 to .49 displ. Easily built from complete kit containing hardware, 2-bladed propeller, shaft and brass housing, etc. No bulkheads or stringers required $4.95



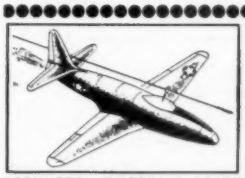
"STUNT ACE" Classes B-C for .19 to .65 engines. Wingspan 40", chord 7", length 27". Capable of performing every stunt known including vertical and horizontal eights. Kit is very complete including leading and trailing edges shaped and notched, wheels, hardware, etc. $3.50



"CIRCLE KING" A rubber powered control-line airplane for only $1.00. Wingspan 30", length 27". Flies on 24-foot lines of thread. May be flown with either CO2 engine or rubber powered. Kit includes bubble canopy, glue, wheels, hardware, etc. Price $1.00

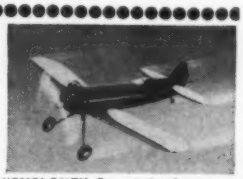


"TRAIL BLAZER" Classes A, B, C. 24" wingspan, 6" chord. The biggest value in a control-line model. Kit includes a carved balsa fuselage, metal bellcrank, wire and full size detailed plans with simple step-by-step instructions $2.95

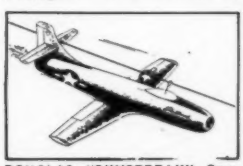


LOCKHEED "SHOOTING STAR" A scale jet propelled model with a finished balsa fuselage bored for cartridge 50c

"WINDSOR" Here's a really simple rubber model. Flights of over 4,000 feet are possible 35c



"CYCLONE" One of the finest control-line training and stunt ships. For engines up to .606 displ. $4.95



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appreciable increases in the times of indoor models will result from a more thorough understanding and use of certain aerodynamic principles, one of which is the aspect ratio. Of course, all that has been said in the foregoing applying to the wing also holds good for the tail. Increasing the aspect ratio prevents the tail from stalling too soon, and this improves the longitudinal stability characteristics of the model. If any other model builders have conducted tests similar to those described above, the author would welcome correspondence on the subject.

Martin AM-1

(*Continued from page* 19)

prise and *Yorktown* sunk 4 Jap carriers, an action which proved the turning point of the war.

Both the Douglas SBD and the Curtiss SBC were designed primarily for scouting duties and included the various equipment, internal arrangement and design features of these duties. Early in the war, it became apparent that an entirely new type of Naval aircraft was needed: one designed to deliver a bomb against its target and nothing else! This new airplane needed tremendous speed, both for getting to the enemy before he escaped and for getting out of the area after delivery of its bomb. Gone was the rear gunner with his weight, equipment and his influence on the layout of the airplane. Gone was the special long-range equipment used for scouting. In their place were engine power, tremendous structural strength and speed plus more speed.

Navy BuAer prepared design specifications for this new aircraft, to be known as VBT (heavier-than-air bomber-torpedo plane), and to possess the following basic features: 48-50 ft. span, 36-40 ft. length, 5000 lb. useful load, 15,000 lb. gross weight, 375 mph top speed, and a range of 1500 miles. In addition it had to include the standard Navy carrier features of folding wings, arrester gear, strength criteria, etc. At the time of this specification the Wright R-3350 engine was the most powerful in production, and this powerplant was chosen by the majority of entrants in the competition. Never in Naval Aviation's long history has such an intensive and extensive period of development of a single type of aircraft passed. This competition produced the Curtiss XBTC and XBT2C, the Douglas XBTD and XBT2D, the Kaiser-Fleetwings XBTK, and the Martin XBTM. And out of this competition came two of the world's most advanced Naval dive bombers: the Douglas AD *Skyraider* and the Martin AM-1 *Mauler*, the latter our Plane on the Cover this month.

Martin engineers, studying the Navy's circular proposal, asked: "Why not use the Pratt & Whitney Wasp Major engine and gain additional fighting power thereby?" The Navy's answer was the unproved nature of the Wasp Major, the most powerful reciprocating engine in the world, and its unavailability in quantity at the time. Martin and Pratt & Whitney engineers assured the Navy that both projects—airplane and engine—would be brought to the production stage in company with each other and the Navy gave the "go ahead" on the Martin XBTM-1, the world's most powerful dive bomber.

Martin engineers designed the new plane in record time and the prototype first took to the air in early 1945. First flight tests proved the new craft air-

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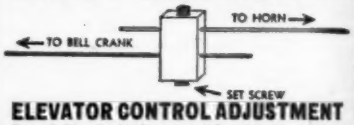

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worthy and seaworthy and a contract was awarded for 750 of the huge bombers. Pratt & Whitney engineers had stepped up production on the giant Wasp Major to a point insuring supply in schedule with airplane deliveries. Then: V-J Day and the feverish activity came to a virtual halt. In the following weeks the Navy carefully reviewed all its current aircraft and engine projects, studied them in relation to its future requirement and its budget situation. Finally, the Martin contract was set at 99 airplanes, far less than the original 750, but considerably more than many other projects received.

The Navy redesignated its new airplane type from Bomber-Torpedo to Attack plane, for that aptly describes the multi-purpose duties of the *Mauler*. As the AM-1, the first production airplane was flown in November 1946 and duplicates began to come off the assembly lines early in 1947. And as they rolled from the plant and winged towards their stations, Naval airmen saw the most powerful fighting ship of the air ever flown.

The *Mauler* is a fighting ship in every sense of the word; no frills, no trimmings, not even much beauty as airplanes go—but packed into every inch of her is brute strength and combat power. In the nose is the monster Pratt & Whitney R-4360 *Wasp Major* engine, four banks of 7 cylinders each, producing up to 3600 hp for emergency and rated at 3000 hp at 2700 rpm for takeoff and high altitude speed. The squat, oval fuselage is built of 75ST aluminum alloy, strongest yet used in a production airplane.

The pilot is located well forward in the fuselage and is enclosed in a large, bubble canopy which is jettisonable in emergency. The windshield is of bulletproof glass and heavy armor plate extends up behind the pilot's head within the canopy. The pilot's seat back and pan are armor plated to provide protection from enemy fire. The fuselage contains no bomb bay with its added size and drag-producing underbelly that would have been required. The *Mauler* just hangs its bombs or torpedo on the outside in a business-like way and flies out to fight. After its load has been dropped it becomes every inch a battleplane with fighter performance.

The wing is of conventional structure but with heavy-duty 75ST alloy used throughout. Inner panels contain the fuel and armament; the outer panels fold upward and inward for maximum carrier stowage. The landing gear is of retractable layout, the two main wheels rotating 90° as the leg swings rearward and upward into the wing. Large fairing plates seal the opening after retraction. The tail wheel folds rearward and up into the fuselage with small, clam-shell doors closing over the opening.

Outstanding feature of the *Mauler* is its unique "finger" dive brakes located along the wing trailing edge. These brakes offer a variety of uses. When closed, they may be deflected downward in a solid panel as conventional landing flaps. But for slowing the *Maulers* 500 mph dive down to a controllable 350 mph, these brakes separate into upper and lower surfaces that, when opened, look for all the world like 120 fingers projecting into the slipstream. Idea of the fingers is to create as much drag-producing turbulence as possible without deflecting this turbulent air into the tail surfaces. Each finger is a rigid triangle to take the beating of the air in the dive. These wing brakes are assisted by a large fuselage panel, which is perforated to provide the required turbulence.

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Armament includes just about everything that could be dropped, thrown or laid on an enemy ship. In its wings are four 20 mm cannon, two in each wing at the folding break. These serve to discourage any air resistance on the trip out or back and are also useful for spraying enemy ships for which the *Mauler* doesn't need its bombs or torpedo. The torpedo is slung directly under the fuselage and is launched, of course, in a horizontal position only a few feet above the water's surface at slow speeed. Main punch of the *Mauler*, however, is its 2000 lb. bomb hung under the fuselage, for this is the particular item it was designed to deliver. But on a dive bombing mission the *Mauler* can accompany this giant missile with two others of the 1000 lb. variety hung under the wing, a full bomb load of *two tons!* But this isn't all, for the *Mauler* can also carry depth charges, mines, 5 in. aircraft rockets, smoke tanks, extra droppable fuel tanks, a radar unit, machine gun or cannon "packages"—in short, about any kind of damage you'd wish to do, the *Mauler* can sling it underneath and deliver it to the enemy!

The AM-1 has a span of 50 ft. and is 41 ft. 6 in. long. It stands 17 ft. high in the three-point position, weighs about 15,000 lbs. empty and up to 21,000 lbs. fully loaded. Top speed is 375 mph at 15,000 ft., and it cruises at about 175 mph over its 1500 mile range. It has a service ceiling of 25,000 ft. and a 1500 ft/min. rate-of-climb.

The first squadron of *Maulers* is now on duty with the Pacific Fleet, the second squadron with the Atlantic Fleet. And with the original contract for 99 nearing completion the Navy has just signed another for 50 more *Maulers*, most tangible tribute to the value it places on this powerful attack plane. The new model features "spoiler" panels in the upper surface of each wing panel to assist the ailerons in tossing the big ship around in the sky. These are simply flat panels which project up out of the wing, hinged at the front, in unison with the adjacent aileron, thereby giving the craft a quicker roll, better control at slow speeds (such as during takeoff and landing) and eases the pilot's stick forces by making larger ailerons unnecessary.

Operating from Essex-class and Midway-class carriers, the *Maulers* are now on duty prepared to deny the seas to enemy ships by the only positive method: diving *straight down*, 10 tons of airplane with 2 tons of destruction—and that, gentlemen, is divebombing that is divebombing!

High Performance Sportster

(*Continued from page* 21)

A few winds are put in the motor to take up the slack, and the model is glide tested. The wing is moved until a long, flat glide is obtained. About 100 winds are put into the motor, and the glide is observed in the air. After a flat tight circle is obtained, the power flight adjustments are made by changing the thrust line.

When correctly adjusted and fully wound, the model should climb at a very high angle in tight, right circles and glide slowly in a somewhat larger circle. The original model flew 1 1/2 to 2 minutes consistently on cool, calm evenings.

A few handsome bound volumes, each contains 6 issues (July to Dec. 1946), are available at $6 each . . . from Dept. B, Model Airplane News, 551—5th Av., New York 17.

Scrap Box

(*Continued from page 3*)

with flying wires. Moore has a unique approach to flying scale. As to fidelity—which we all butcher to varying pronounced degrees—he begins with the areas, etc., that are as close as possible to scale and yet permit the model to fly properly. Then he begins to cut down, ultimately arriving at the closest possible ship to scale that will still fly. Despite accuracy and detail he sets 60 seconds as his minimum. Moore opposes gadgetry for the sake of gadgetry, but has solved some fundamental problems with gadgets. For rubber-powered models he has worked out a system now known as the Moore Diaphragm. This is a sort of bulkhead which divides the rubber motor into two separate sections: a short but heavy forward section, and a long lighter section between bulkhead and rear hook. The result is a scale ship that will balance despite the handicap of a long rubber motor, and without ballast! For engine powered models he employs a movable bulkhead for an engine mount. This bulkhead may turn with torque until a stop is reached; or it may be hinged to swing forward with thrust, again against a stop. In either case a linkage connects to the rudder to compensate for torque, the bugbear of motor-equipped scale models. All this is put so crudely that it does poor service to Moore.

Some idea of how the man works is evident from the fact that Moore even constructed a home made wind tunnel in which he tested propeller drag for varying diameters and pitch-diameter ratios, with both freewheeling and locked props. Of interest is his observation that above a pitch-diameter ratio of 2/3 the prop has less resistance when freewheeling; but when the ratio is less, the fixed prop is at an advantage. Moore also found that the diameter necessary to destroy glide was about half the span. With slight reductions in diameter, glide suddenly reappeared, improving steadily until diameter was 2/5 span, after which gradual reductions had no further effects. A final novel note is his use of automatic trim to make the model flare out for a perfect three-pointer after the manner of the real ships.

HAVING GOT THIS off our chests, we'll pass along the latest wrinkle in CO2 as reported by L. H. Kelly, secretary of the *Nashville Aero Club*, who proves despite our moaning that there is always something new under the sun. "We staged a demonstration for our members during a club meeting," begins Kelly. "This is something rather new, a CO2 type motor mounted in a small control line ship and powered by compressed air. The compressed air was continuously supplied through a flexible plastic tube from a compressed air generator."

Credit for this unusual idea goes to Bill DeLorme and Vernon Hohn, who spent a great deal of time experimenting with this system of flying. A standard rubber air hose connects the generator and a push-button control. From this control a flexible plastic hose of about ⅛" diam. runs out to the model. For straight jet, the flexible hose passes through the wing and fuselage to the tail nozzle. It seems to us that this should be fertile ground for multi-engine experiments, or lightly built scale jet jobs, like the P-80 or *Thunderjet*.

WE ARE finally able to get around to a long letter from Kenneth Ernst, past president of the *Indiana Gas Model Association*, who now speaks his piece as a member. "When we sent you our letter criticizing A.M.A. for their method of setting rules," begins Ken, "we were concerned that all advance information seemed to indicate that wing loadings were going to be greatly increased.

"We objected for several reasons. It did not seem democratic to change rules without the vote of all model builders. We felt board members would be influenced by personal opinions. If wing loading was in-

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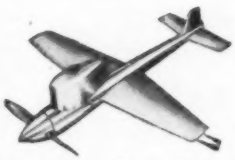

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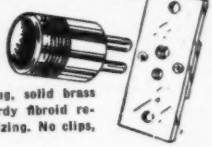

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creased, beginners would have a tougher time and, lastly, we would have about 100 models go obsolete. But, like most people who yell before they are hurt, the rules are much better than were anticipated. But we still object to the method of setting rules.

"We realize the job it would be to send out 30,000 mailing pieces (Nichols reported that A.M.A also favored the individual ballot, but that cost was an obstacle), but why not make it a one way deal? This could be accomplished by printing a ballot in all leading magazines." Maybe you have something, Ken. Ernst also suggests that each club could kick in a fin to cover the cost of sending assistants to help out at ballot-counting time.

OUR OLD FRIEND H. A. Thomas comments wryly, "After reading the current 'Scrap Box,' I deduce that speed flying rather curdles you." Well, H. A., we dunno. Ken Ernst wound up his letter with the admonition, "Quit kicking free flight in the teeth!" Anyway, the soap box is yourn, H. A. "Just because some fellow out west flies a model 150 mph," thinks Thomas, "we don't have to throw in the towel. Actually, the boy of moderate abilities is stymied to a far greater extent in other categories, as in competing with Walker and the Goods in R. C., or Andrews in indoor, and some of the wizards in stunt. There is less luck as a factor in speed and it isn't altogether a case of engine speed. Many delicate adjustments of trim really pay off, and I doubt if any other phase of modeling has made fellows more conscious of propellers."

SPEAKING OF SPEED, we hear that Len Wagner, secretary of the *Buffalo Flying Bisons*, flew his *McCoy* 49-powered *Demeco Speedwagon* at 163 mph for a new official record. The flight was made indoors at the State Armory on the last day of the winter flying season. A few days later Harold DeBolt—ole man Speedwagon himself—got whizzing at 149 with a *Mc 29*, but unofficially. Nice going, Wagner. . . . Let's also give a hand to this hard working DeBolt, flier, designer, manufacturer, a modeler's modeler. Both machines, incidentally, used glow plugs.

DON MATHIS (Dallas) is hot under the collar about remarks in a previous issue concerning modeling in Dallas, particularly as regards those speed marks. Well, Don, we never personally doubted that 107.4 A-speed record of Stanglin's. After all, times are climbing to as high as 163 with a "49," and if they can time that they can time anything. For the record, Mathis tells us there were 5 watches on Stanglin's flight and that none varied as much as the allowable tenth of a second. To the remarks of a certain visitor from Arkansas, Mathis states that Dallas held four national records (at the time of writing): Stranglin senior B at 99.79, and senior A at 107.4. Jum Clem holds Open A at 106.21 and Sam Beasley Senior C at 133.28. All these marks were made with glow plugs and Rev-Up props, though what work was done on the props isn't known. Clem and Stanglin did cut down the tips a little but Chris Machin, the manufacturer, says it isn't necessary. We hope this sets things aright, Don.

BILL TENNEY, the *Dynajet* man, is going to town these days, along with his jets. If you like seeing an underdog succeed, keep an eye on this fellow. Against impossible odds of prejudice and official discouragement, Tenney has persisted, and at great expense, in hammering home the possibilities of the jet. Last April 11 Glenn Temte, *Minneapolis Model Aero Club*, did 152.4 on 60 ft. lines (therefore unofficial). As we go to press, there is a report that Bunting, from No. Carolina, has done about 160 officially. Contest results begin to show jets doing better than gas in some localities. The boys have learned about big tanks and clean models and no one knows where the top is. We'll take the opportunity to squelch rumors that *Dynajet* is going out of business; actually, *Dynajet* also builds larger jet engines for both the

(*Turn to page* 42)

Arden engineering SCORES 2 NEW HITS

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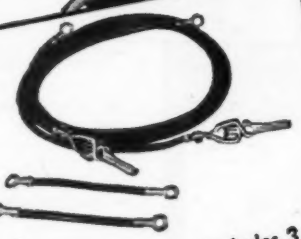

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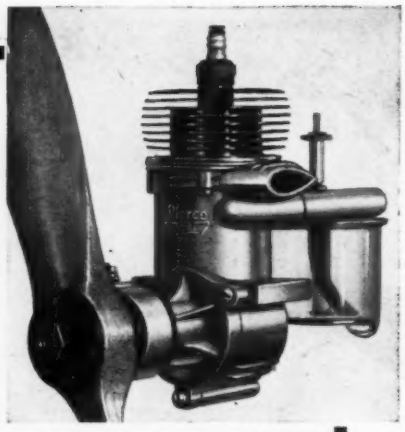

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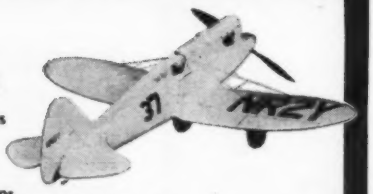

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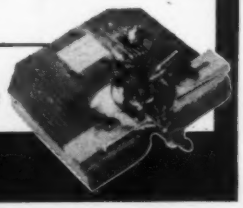

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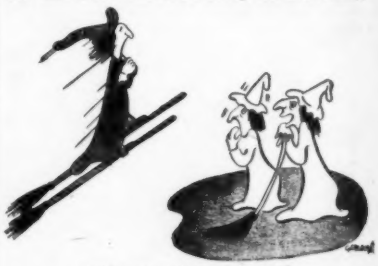
(*Continued from page* 40)

Army and the Navy, and Tenney thinks the models have only begun to get going. The trick in jet is the powerplant installation, and here many people go wrong. Tenney gladly straightens out all such trouble by mail, so, if you have jet headaches, drop him a line at the Aeromarine Company.

YEP, LIKE we said, they'll bust 200 mph yet. We still think all speed jobs should be toned down for we fear super speeds are going to prove dangerous. For example, some Philadelphia boys came up to a Jersey meet not long ago equipped from stem to stern with some plenty-hot *Doolings*. Cal Smith, who looked in on this contest, was stooping over to talk to a guy cranking a motor when one of the *Dooling* jobs disintegrated at 127 mph. Wing failure, probably. The projectile fuselage, *Dooling* still screaming, whizzed over heads into the ground. Fortunately this story has its amusing side. When the ship broke up, one of the timers—and you know what kind of timers they sometimes have—piped up in an awed tone, "Gee! It hit the supersonic wall!" To which a nearby spectator added, "Where, I don't see nuthin'!" And for that, Smith, you get the monthly award of a free subscription to MODEL AIRPLANE NEWS for the best tall true story of the issue.



"They say these twin-boom jobs are the coming thing!"

World War I

(*Continued from page* 25)

the engine would stop if the throttle were opened fully.

The air pump was a double acting type, both plungers of which were operated by a small crank attached to the front end of the camshaft.

Mercedes V-8

Apparently an attempt to match the higher crankshaft speeds developed by the Hispano-Suiza V-8, was the Mercedes D IIIb engine, of which 272 examples were produced for service trials. This engine was used in several experimental aircraft, but not in front line production models so far as is shown by existing W. W. I information. The D IIIb developed 185 hp at 1800 rpm. Nothing further is available on the engine.

Mercedes D IV

This engine was the only 8-cylinder in line model produced by Daimler under the Mercedes trade name. It appeared in the spring of 1917, and saw a comparatively limited production life. Only 424 examples were manufactured.

After the success of the initial and basic D III Mercedes, which was at first used in both two and single seaters, apparently it was decided to increase the power available by simply adding 2 cylinders to a straight 6 to get a more powerful straight 8. The new eight-in-line, model D IV, utilized standard D III cylinders, pistons, valve gear and rods. The most outstanding alteration was in the new crankshaft and use of a reduction gear to drive the propeller. Normal crankshaft rpm was 1400; but this speed was reduced in the propeller shaft by gearing, to 910 rpm. Compression ratio of the D IV was the

same as its 6-cylinder brother, 4.5:1.

The engine was rated at 220 hp by the Germans, although examples captured by the British and French and tested, turned out as much as 287 hp at 1750 rpm, and 242 hp at 1350 rpm. Little else can be said regarding this engine and further attempt at description would be a repetition of basic Mercedes D III details.

Mercedes Type D IVa

This was an entirely new engine, from stem to stern, a 6-cylinder in-line, water-cooled job rated by the Germans at 260 hp at 1436 rpm. Under bench testing, however, these engines produced 252 hp at 1400 rpm. Below a speed of 1150 rpm the Mercedes D IVa was found to be unusually rough.

Model D IVa was designed exclusively for two seaters and was to that class what the D III was to the single seaters. It is a matter of record, however, that D IVa engines were installed in several German pursuits experimentally. This new engine, which appeared at the Front early in 1917, was at first used in Gotha and Friedrichshafen bombers. Its bore was 160 mm and stroke 180 mm. Compression ratio was 4.94:1. The engine complete without fuel, oil or water, weighed a hefty 936 lbs.

D IVa followed closely the accepted design of the earlier 160 hp D III, and in spite of its size was a clean serviceable design. Its overall length was 6 ft. 5½ in., overall height 3 ft. 10 in. All valves were interchangeable as in other models, and were operated by the same type of overhead camshaft. A half compression gear, similar to that of the 160 hp Mercedes was employed.

Carburetor on the D IVa was single, with a main jet and a slow running (idling) jet. Lubrication was forced to all bearings through the drilled crankshaft from a four-throw eccentric driven plunger type pump. Ignition was provided by two Bosch Z.H.6 magnetos driven off the vertical cam driving shaft. One was a starting magneto, that is, it had an impulse coupling.

Generally speaking, the D IVa was simply an enlarged D III type. And like its smaller brother was produced in large quantities. Its production of 4502 examples made it the second most numerous Mercedes.

Mercedes D VI

Before you wonder what became of the Mercedes D V, it should be explained that the Roman numeral following the "D" designation indicated the horsepower class of the engine. This was the method used by the German Air Ministry in referring to the power of an engine. Under this system, O indicated 80 hp; I, 100 hp; II, 110/120 hp; III, 130/190 hp; IV the 200/260 hp class; V, 300 hp; and VI signified a 500 hp engine.

As for the DV, none were made.

The D VI was a monstrous 18 cylinder powerplant, of which no constructional details could be found. It was water cooled and presumably followed standard Mercedes practice. The cylinders were arranged in a "W", had a bore of 138 mm and a stroke of 190 mm.

How many of these huge engines were built is not known. But it would be safe to wager that, if the First World War had continued the Mercedes D VI would have come into some prominence.

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Slick

(*Continued from page 27*)

trailing edge, you can use it to cut the inside and outside edges of the trailing edge for both wings so they will be identical. The fuselage outlines can be drawn on paper first if you wish, but you might just as well draw them on the balsa block or blocks themselves. We'll go into this later.

Start with the wing, which is needed to make an accurate fuselage cutout to hold it. Pin the leading and trailing edges down over your plan, with waxed paper between. Now cuss a little if you forgot to file the notches in the trailing edge, unpin the trailing edge, file or cut them in, and put it back again. Cement the ribs to the trailing and leading edges. The front and rearmost points of each rib touch the layout board, so no blocking or propping up is required. The top spar is put in while the wing is on the board, and the bottom spar last, when the rest of the wing is dry and has been taken off the layout board.

The wing spar alignment appears slightly off kilter, but this is due to the top spars following the wing lines while the bottom spar is at the deepest point of the undercamber of each rib, for the practical reason of forming a base against which the light Silkspan used in covering is first cemented. It is cemented along the entire length of each wing bottom spar; the tissue is then cemented to the ribs, working outward toward the edges.

When both wings are made they are joined at the center, with each tip raised 2 1/2" above the center for dihedral angle. The space between ribs 1 and 2 of each wing is covered with 1/32" balsa which has been sanded somewhat thinner. The airfoil is altered very little this way, and the ribs need not be cut down to hold the sheet, and are not shown that way on the plan. The rest of the wing is covered with tissue.

While the strip wood is out and laying around the floor, we ought to polish off the stabilizer. It is straight, with neither dihedral nor cathedral, and is made in one piece. Be sure to use lots of cement at the center where the spars of each side touch each other.

The rudder is left for last, as it is in two sections which must jibe, one on the stabilizer, and one on the fuselage.

Fuselage construction is simple, and we will race against time with a carved fuselage any day of the week. Start by spot-cementing together two blocks, each 3/4" x 2" x 18" soft balsa, so they can be separated later for hollowing. Lay out the dimensions of the side and top views; if you do not have curves for drawing the exact outlines, pin a strip of 1/8" sq. balsa along measured points. The strip will automatically assume the right curve. Top and bottom of the fuselage are parallel between A-A and B-B. Draw around the balsa strips with a soft pencil, then remove the strips. Draw the nose angle against which the cowl fits. This is important because it insures about the correct amount of downthrust right from the start. Saw out to top and side outlines, then carve the fuselage to an oval crossection. Crossections A-A and B-B are identical.

When the fuselage has been carefully roughed out with a knife, proceed with a coarse grade of sandpaper, progressing to medium then fine. No sanding sealer or dope is applied until the wings and tail have been fitted. Separate fuselage sides, hollow out and rejoin. A wood gouge or half-round chisel is ideal for this work,

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although an old spoon swiped from mom or the wife can be sharpened, and works quite well, if the balsa chosen is as soft as it should be.

After the fuselage is shaped, make a straight cut to form the flat surface against which the cabin is cemented, and another cut running into it forms the "instrument board" line. Place the cabin block which is 1" x 1" x 2 1/2" against its seat, and trace along its bottom where it fits against the fuselage. Cut to this outline then cut to side outline; shape, hollow, finally cement in place with a stiff acetate or celluloid windshield.

Correct wing setting is had by tracing the outline of wing rib 1 against the fuselage side, with leading edge 3/16" higher than trailing. This section is then cut out. It will be too small but can be enlarged later. Sand the bottom of it to fit the wing, but do not alter the incidence setting. A straight line extends through the bottom of lead and trail edges and forms the wing seat bottom. Diagonal cuts come down to meet it. The part removed is fitted against the top of the wing, cutting and fitting until the fuselage top outline is continuous when wing and wing seat are in place; then this part is cemented to the top of the wing. The unit is held to the fuselage with cellulose tape while flying.

The stablizer support is 1/16" sheet pine or hard balsa and is set in 1/16" to be flush with the remainder of the stabilizer seat.

Next make the cowl. It is easily carved from medium hard balsa, spot cemented to the fuselage nose, and is also hollowed. Bolt the motor to a piece of 1/16" plywood, slip the cowl down around it and trace the cowl outline on the plywood, then cut the plywood to shape. Cut a piece of 1/4" thick hard balsa sheet (grain vertical) to the same shape as the plywood and very firmly cement to the fuselage. A hole is cut out of it so the cartridge holder can pass through. The part cut out is cemented to the back of the plywood, forming a plug that lines up the cowl and fuselage when they are held together. This plug which is cut from the 1/4" sheet, is at least a 1 1/8" circle. A small projection on each side keeps the motor unit from turning in its socket.

The spinner shape is traced on all four sides of a small balsa block, carved square, then rounded. If you have a lathe or hand grinder the spinner may be turned on it. Hollow the spinner enough to clear the prop front washer and nut. It is cemented to the face of the prop, but don't do such a good cement job that you can't get it off when you want to change props.

Tissue grain is spanwise on all surfaces. Encircle the fuselage with a layer of Silkspan around the area under the wing where the cartridge holder rests. Water shrink the tissue, and give it three coats of thin dope. Give the fuselage three coats of sanding sealer, sanding in between each coat, then a coat of colored dope. Use a bright color so you can find your model in the brush or grass which hides many small models that have flown out of sight.

The cartridge holder should not rest horizontally, but should incline upward at the front so the liquid CO2 does not run into the motor. A guide or rest of some kind may be bound to the cartridge holder near the outlet to insure proper position.

Wings, tail and motor may be held on with the time honored rubberbands, but

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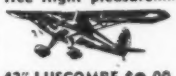

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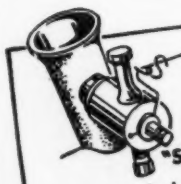

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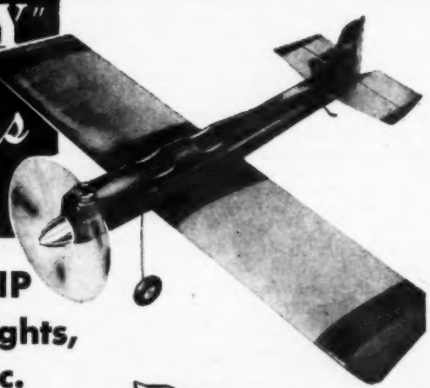

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Weight—1 ½ pounds (with 6 oz. motor)
Power—Any Class "B" engine (.30 to .45 cu. in.)

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cellulose tape saves weight and drag. Turn back one corner of each piece of tape so you can get it off again. On a well doped surface the tape that holds the motor must be no more than 3/4" long (one piece on each side), as it is meant to part under stress, saving props and crankshafts.

You have a good ship now and need only a good day—the hotter the better—and enough Wheaties to hoof after it. Take your binoculars, too. Better yet, install that dethermalizer you've been wanting to try out.

Flying adjustments are the usual ones. Small blocks behind the motor are tightened in place for thrust adjustments. Rudder adjustments are made by loosening the tape that holds the rear of the tail assembly, shifting the entire assembly, then retaping. This angling of the stabilizer along with the rudder, when the stabilizer is swept back, generates more lift on the side on the inside of a turn, which is helpful. Fore and aft balance is shifted by bending the supply tube and thus shifting the position of the cartridge holder.

Operation of "Hot" Engines

(*Continued from page* 20)

obtained from junk dealers for four or five dollars.

From the modeler's standpoint, objections to this form of starting unit are that the storage battery required to supply current is expensive and heavy to carry around. It occurred to us that one method of overcoming these difficulties would be to provide means of hooking up the starting motor to the battery of a car. In many cases cars may be driven right up to flying fields and are used as a means of getting to them. A description of such a starting arrangement which I have worked out, mainly for the purpose of making home tests of model engines mounted on wood bases, may be of interest.

A small Auto-Lite starting motor was obtained from a junk dealer for $5. This was mounted on a piece of 5" x 16" board by means of a metal strap which passes over the motor and is bolted to the board at each side. One of these bolts is used as the negative terminal. The unit is attached to the running board of the car with a "C" clamp and connected to the car battery by means of heavy cables with alligator clips. A piece of car heater hose was forced over the motor shaft and secured with a hose clamp. After wrapping a layer of friction tape over this hose, a second hose having a diameter of 1" was forced part way on and secured with another hose clamp. The spinner of the engine to be started is pushed into the end of the large hose, which projects about 1" beyond the small hose. The operation is performed after the electric motor has been started.

Some points on the construction of this starter may be mentioned. The hose must be centered on the shaft so it does not wobble. When the end of the hose has worn, considerable wobble will occur and the hose should be turned end-for-end or replaced. Because of the low battery voltage and relatively high current, the battery cable must be heavy to reduce resistance. The cables used were extra heavy and quite costly, but automobile starter cables will do and this will reduce expense, especially if they can be obtained secondhand. It is somewhat difficut to make connections with heavy cable.

Theoretically, soldered connections should be used, but the friction connections used in the setup seem to work all right. I refer to the connections between the cable and clips and cable and terminal attachments. For one-man operation a switch should be installed on the starter unit, but if a helper is available the motor may be operated by connecting up one lead and pressing the other against the proper motor terminal. Since the motor is only run for a few moments at a time this method is quite satisfactory. When starting model engines in this way the spinner is subjected to considerable strain, and trouble may be experienced at times with built-up spinners. A solid spinner, which is stronger, may be turned out by a machine shop in a few minutes at a moderate cost, or can be had from some model suppliers.

A West Coast engine manufacturer reports that inertia starters now are being used extensively by modelers in that area and that a very fine unit comes from a Fairchild PT-19 plane. It can be purchased for about $4, and about $5 additional is required for steel and welding in order to complete the base.

For starting model engines at home, an a.c. motor of the type that provides a high starting torque may be used; but suitable secondhand motors are difficult to secure and new motors are rather expensive. It is believed that a motor with an output of from 1/3 to 1/2 hp would be suitable.

The engine is mounted on two oak blocks about 3/4" high which are securely attached to a 6" x 12" softwood base with long brass wood screws. The oak blocks position the engine so that the fuel tank may be located with its top slightly below the level of the fuel intake tube on the engine, which is the most favorable position for easy starting. The tank is made from a Mercury lighter fluid can which holds 4 oz. of fuel. The soft metal spout on the can is bent around so that the end is above the maximum fuel level, reamed out to provide a larger passage, and used as the means of filling the tank. A piece of copper tubing is soldered to the top of the tank to supply an air inlet. This tube is provided with a brass cap to seal the tank when the engine is not running.

A short piece of copper tubing is soldered to the side of the tank close to the bottom, and a transparent plastic tube about 2" long conducts the fuel to the engine. This transparent tube reveals the fuel level in the tank when the engine is not turning and shows whether fuel is flowing when the prop is spun.

The spark coil is mounted on two vertical bakelite strips which position it so the magnetic field is well away from metal parts and the leads can be made short. The coil is of the type which may be operated for a short time with a battery voltage of 4 1/2. The condenser is designed for racing engines. A Type 4F2H Burgess 3-volt battery is used, partly because of its convenient shape. It is mounted at the rear of the board base to provide a self-contained source of current. A spinner having a maximum diam. of 2" is mounted on the end of the engine shaft. A small portable bench was made to which the assembly can be clamped for convenient operation.

Racing engines are nearly always operated on methanol-castor mixtures when maximum power is required. In fact, operation on gasoline at maximum speed is apt to cause overheating and possible damage to the engine. Methanol fuels absorb a large amount of heat, lower the

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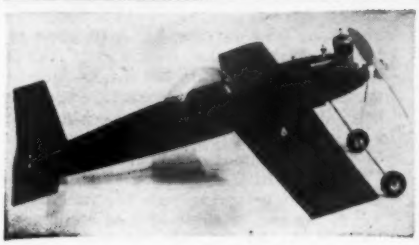

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temperature of the intake tract, and cause the air to contract so that a greater charge enters the cylinder. Methanol base fuels are on the market which are blended with special ingredients to increase power, reduce trouble from hot spots in the engine, and dissolve sludge. Most of these fuels are not at all harmful—but it is advisable to rinse the engine out with gasoline after operation because they tend to draw moisture. When experimenting with fuels it is a good idea to remove the sparkplug after a short run and examine the piston head. If it looks dry, use a mixture with more oil. If the piston and plug are quite wet, on the other hand, a little carbon tetrachloride placed on the plug and in the cylinder will dry them and facilitate starting. Only a small amount of this chemical should be placed in the cylinder, however.

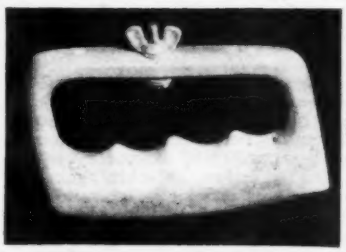
Those modelers who are going in for racing in a big way will find it advantageous to experiment with various fuel blends. One of the manufacturers of special fuels for racing engines issues folders containing helpful information on this subject. Atmospheric conditions, especially the relative humidity of the air at the time the engine is in service, have an important bearing on power output.

Interest in the glo-plug has been great and is increasing. A number of fuels especially prepared for glo-plug operation now are available, and manufacturers are furnishing instructions on the operation of their engines with glo-plugs. It is important to use the model of glo-plug which will bring the glow coil to the proper level in the combustion chamber. Commercially prepared methanol base fuels for spark-ignition engines usually will give satisfactory performance with the glo-plug, but easier starting and higher output will be obtained with specially prepared methanol base glo-plug fuels.

When the modeler wishes to mix his own glo-plug fuel, one engine manufacturer recommends the use of 2 parts castor oil, 3 parts methanol alcohol, and 3 parts nitro methane. No gasoline, mineral oil or ether should be mixed with this formula. When using a glo-plug in place of a sparkplug it is necessary to open the needle valve one or two more turns for starting. After the engine has been started and the battery disconnected the needle valve should be adjusted for smooth running.

Suction rather than gravity fuel feed is used on most model engines. One manufacturer states that both systems were tried with engines powering control line planes and little difference in performance was experienced except when the engine was inverted. Then some trouble from flooding occured with gravity feed. Setting the fuel tank so the fuel is just about to run into the intake tube of the engine is helpful to starting. Of course this condition will exist only when the tank is full, but that is the condition under which most engines are started. There is a little float feed regulator on the market which permits the fuel feeding to the engine to be kept at a constant level regardless of the fuel level in the tank. The tank is placed above this device so the fuel feeds to the float chamber by gravity.

For some of the points brought out in this article I am indebted to J. R. Forster of Forster Brothers; Wilfred G. Orr of Orr Engines Inc.; John E. Broadbeck of the K. & B. Manufacturing Co.; and E. J. Lorenz of Aero Spark Inc.



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Air Ways

(*Continued from page* 31)

A QUESTIONNAIRE TO modelers and model clubs is being circulated by Don Warner, AMA Industrial Leader, Box 1581, Lakeland, Fla. Mr. Warner is interested in such questions as: When was your club organized? Who sponsors the club? Is club associated with a County, State, or Regional model group? Does club have a newspaper? Have you an active publicity director? Are members keeping up with dues payments? Are interesting guest speakers available for club meetings? And so forth.

Mr. Warner feels that clubs should give the member something in repayment for entry fee and dues. He further feels that many clubs are failing in this respect. He points out that each member has a definite responsibility to the club, the club in turn has a responsibility to the state group, and so on right up to the national model agency; and these responsibilities must be met if the hobby is to be kept on a sound basis. Having been very active in club work, both in Pennsylvania and Florida, Mr. Warner has a deep knowledge of such activity and a desire to see it grow. Why not write him how *your* club is getting along so that he can gather ideas from clubs all over the country on how they keep members interested, get club activity high, and how to make sure each member gets something worthwhile from his association as well as gives something in return.

* *

Picture No. 1, submitted by Michael McAllister (1513 Charlotte St., N. Y. 60) shows his model called *Rebel*. Sorry we can't elaborate on this nice job since Mr. McAllister said very little about his rubber model.

C. B. McKennon (Box 290, Greenville, Ala.) used plans published in MAN, March '45, issue to build the model in No. 2. The fuselage is hollow and constructed of fibreboard. Cowl, hood and radiator shell are tin, with the radiator front made from a brass screen. The motor is an OX-5 carved from balsa with valve rocker arms made of wire. The *Jenny* cockpit has celluloid windshields, upholstered seat, safety belt, instrument panel, with varnished wood stick and rudder bar. Controls are movable and all may be moved by placing a forefinger on the stick and pushing the rudder bar with a pencil. Wheels are tin, with tin bearings and tires of wire wrapped with tape. Rubberbands are used for shock absorbers. Wings are of balsa, with threads to make rib outlines. Wing-walk is made from black sandpaper with decal letters by the side reading "No Step." Even in a larger size this would be an unusual model, but note its proportions as compared to the pack of cigarettes.

Charles Davis (Piggott, Ark.) sent in No. 3 of *Yonder*, made by his friend Richard Perry. It is a Class D stick, having a span of 50". It has a 5 minute flight to its credit and has proven an excellent flyer.

No. 4, built by Kermit Hanson (Pelican Rapids, Minn.) is his first gas pusher and was made from plans featured in our Oct. '40 issue. Wingspan was 56", length 40", with a wing area of approximately 375 sq. in. The model flew well, but it was very heavy and a stall near the ground resulted in a crash that ended its career.

D. Upham (18 Bryn Mawr Ave., Cynwyd, Pa.) has sent us No. 5 of

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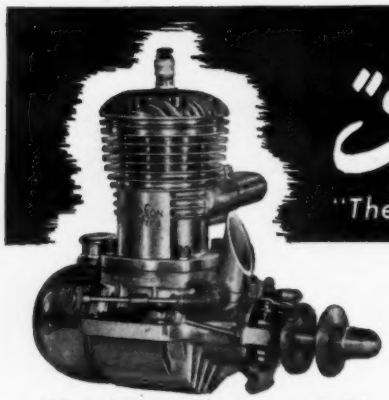

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- BORE—15/16", STROKE—7/8", COMPRESSION RATIO 6-1
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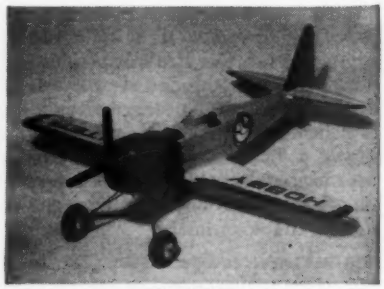

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We carry a complete line of model supplies—If it's in Model Airplane News—It's 10 to 1 we have it.

THE HOBBY CENTER, INC.

916 Adams Street **Toledo, Ohio**

Miss Shirley Sanders' first model, a CO2 design. The plane is an *Olympic*, made from a commercial kit. Again, very little info on flying results has been furnished.

No. 6, a Curtiss F9C-2 *Sparrowhawk*, was submitted by R. G. May (1717 Encinal Ave., Alameda, Calif.) and his plans for the ship were drawn from two pictures, so there isn't too much accuracy regarding scale. Span is 31", length 21", wing area 231 sq. in. In the picture it has a *McCoy 29* and a 12-6 prop cut down to 10-6. Barely discernible is the "skyhook," which has saved Mr. May almost $5 in sparkplugs when the model nosed over during landings. With a scale Navy-type hard rubber tailwheel, carrier hook, and wheel pants, it looks very realistic.

The combined efforts of Albert E. Hatfull (42, Sandal Road, Edmonton, London, N. 18, England) and Arthur Roberts produced the autogiro in No. 7. Roy Clough Jr. inspired this model with one of his articles in MAN. Using his suggested formulae and proportions, they obtain good 30 second flights, some in rather windy weather. Diameter of the rotor disc is 22".

No. 8, submitted by Dick Osterman (Box 875 McLaughlin Ave., San Jose, Calif.), shows a control line model powered by a glow-plugged *Arden .099*. The fuselage was carved from a balsa block and covered with cloth. The landing gear was made from a piece of phonograph spring. However, this model hasn't tried its wings as yet.

Fred Davis (Long Island Ave., Medford, L. I., N.Y.), who submitted No. 9 of his beautiful *Sea-Bee*, is proud that his model won 1st place in the Beauty Event at the Hobby Show in Madison Square Garden, N. Y. C. It has a 74" wingspan and is powered by an inverted *Ohlsson "60."* Construction is conventional, with planked fuselage, papered wings and tail, landing gears retractable, and an .064 plexiglass "green house" to really dress the plane up. Total weight was under 5 lbs., and flights were exceptionally fine.

No. 10 shows the *Air Bum* built by Bertram Bland (c/o A. A. Hodgkinson, Ltd., 101 Duke St., Port-of-Spain, Trinidad, B.W.I.) Wingspan is 38", with an over-all body length of 30". Weight, nevertheless, is 8 oz. and the model is powered by 24 strands of T-56 brown contest rubber. It has a one-blade, 10" folding prop which was given 324 turns to launch it on a recent test flight at Queen's Park, Savannah. While gaining altitude, it circled and was followed closely by a cluster of corbeaux. It was lost from sight after 25 min. and actually flew for 45 minutes; the model was recovered later.

No. 11 features a model made by Harold W. Pierpoint (Benedict, Kans.), who is on the list of readers giving "little info." However, he does mention that the plane is powered with a *Dyna-Jet* and flies very well.

NEWS OF MODELERS

John Malkin (19 Reservoir Rd., Waipuluran, Hawkes Bay, New Zealand) is eager to correspond with a fellow modeler, interchange ideas and model planes.

Anthony Holmes (55 St. Ignatius Rd., Dublin, Eire) would also like to write to a boy and exchange airplanes, magazines and papers. Beside model flying, both solid and flying, stamp collecting and chemistry are his hobbies.

J. Appi (The Horse Shoe Hotel & Restaurant, Tottenham Court Rd., London W. 1.) is keenly interested in radio control model aircraft and would like to swap radio parts.

Stanley Dobson (16, Weardale Rd., Carlisle, Cumberland, England) is 17 and for the past 7 years has been building models; he is now, however, a confirmed U-control fiend. Like other English fellows, he would like to correspond with an American modeler.

K. D. Coates (19 Limehurst Rd., Darlington, Co. Durham, England) is 22 and primarily interested in contacting someone who prefers free flight models.

Dilip Kumar Mittra (Old Kamptee Rd., Itwari, Nagpur-2, C.P., Indian Union) is 18 and would enjoy corresponding with someone interested in anything and everything to do with model building.

Capt. H. M. Bourgeois (VMF-323, MAG-33, MCAS El Toro, Santa Ana, Calif.) about 3 months ago sent in a request to write to English airmodelers, which request was printed in MAN. Since then he has been swamped with replies—73 in all. Naturally, it would be impossible to correspond with that number of individuals. If you write Capt. Bourgeois he will be delighted to give you one or more names and addresses as well as the model interest of the person. He also wants it known that the British have a diesel of about .025 cu. in. displacement which might interest American model builders.

Thomas E. Wormley (Four Jail Terrance, E. Perth, Western Australia) who used to live in Bakersfield, Calif. until he enlisted in the Navy, would like to get in touch with his U. S. A. modeler friends.

We received a communication from Jim Bucheridge (Blossom Way, Hillingdon, Middlesex, England) who was a member of the *Pharo's M.A.C.* for whom we arranged a contest with the *Cleveland Balsa Butchers* back in '46. The *Pharos* have since had to disband but Mr. Bucheridge and his colleague, Alan Armes, are now members of the *Brentford & Chiswick M.F.C.* They are principally interested in indoor microfilm models—a form of flying which has been sadly neglected in England—and feel it is high time something was done to improve their technique. They are eager to correspond with a club of American modelers interested in this sort of flying. One of their main troubles is inability to get a proper grade of brown contest rubber, and they have done all their flying with 1/8" flat black rubber. We feel sure that some American indoor enthusiasts will be glad to help out these English indoor flyers.

CLUB NEWS

California

Southern California Model Congress informs us that the *Flying Gremlins Club* is no longer in operation. Is your Club still on the active list? If so, SCMC Sec. Kenny Aymar, 212 D. W. Verdugo, Burbank would like to hear the latest goings-on. For instance: Have you moved or changed your meeting date? Do your representatives regularly attend meetings of the SCMC? Do contest directors notify the state association of coming contests so they can be placed on the contest calender?

The recent corr. Secretary William Sweet of *Thermal Thumbers* wants it known that little Jene Wallach walked off with the sweepstakes perpetual Cal-Aero trophy in the junior division, and S. Greenhut is holding the sweepstakes honors in the senior department. Future items from this organization will be sent in by Joe Weathers.

We learn from "West Coast Model News" that Myrtle "Mom" Robbers of

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FLY CO_2

OK CO_2 Engine $4.95
Lancer CO_2, $1.50; Megow CO_2 Spec.. 1.50
CO_2 Powerhouse, $1.50; Playboy, Baby 1.00
7" Props, Floterque, 20c; Hithrust ..... .35
CO_2 Capsules 10c each, 12 for 1.00

MOTORS—Immediate Delivery

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Ohlsson 23	9.95	Arden 199	18.50
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Ohlsson 23 RV	10.95	McCoy 29	18.50
Ohlsson 23, Glow	9.95	McCoy 49	25.00
Bantam 19	16.50	McCoy 60	27.50

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Orbit	6.95	Meteor	7.50

FREE FLIGHT KITS

Playboy Jr.	3.25	Westerner B	4.50
Playboy Sr.	6.00	Powerhouse B	4.95
Zipper	5.95	Westerner C	5.95
Sailplane	8.95	Stinson Reliant	17.50

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Thermalier	1.00	Comet Gull	1.50
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Dynamoe	1.50	Flying Cloud	1.50
Eaglet	.50	Condor	1.00
Floater	2.00	Thermic 100	7.50

SPECIAL — AIR-O SPEED PROPELLER FOR C or D ENGINES Complete—Counterbalance with one blade ..... $2.00; Extra blades ..... .50

ACCESSORIES

Aero Coil, Lt. Wt.. Quality	2.50 / 3.00	.030, 3c; .035 & .040, 4c; 1/16, 5c; 3/32, 10c & 1/8, 15c.	
Aero Metal Cond.	0.35	Austin 4-way wrench	50c
Toggle Switch	0.50	Arden GlowPlug	85c
Slide Switch	0.30	Control Wire, 100'	65c
Pee Wee Clips, ea.	10c	Veco Air Wheels, per pair 2½" 2.15, 3½" 2.50 4½"	2.75
Spark plugs, state size	50c	Sponge Wheels, Alum. Hubs, ⅞" per pr. 20c; 1⅜" pr. 30c; 1⅝" pr. 50c; 2¾" pr. 60c.	
Austin Timer	1.50	Floterque Props, 8"-14"	35c
Battery Box, Lg., Med. or Sm.	0.40	Hiball Props, 8"-14"	35c
Mounting Bolts	4/10c	Tornado Speed Props, 8, 9, 10 Dia., 10, 12, 14 pitch	50c
Flexible Needle Valve	1.25	Plywood Sheets, 1/16, 3/32, ⅛, 3/16, ¼, 6"x 12"	35e
Neoprene Tubing, ft.	25e	Ball Bearing, Sm. or Lg.	10c
Airflo Wedge Tank	1.00	Alum. Tubing, ⅛" O. D., 1/16 O. D., 3/32 O. D. Ft.	15c
Walker U Reely	7.50	Testors Carved Balsa Props, 12", 14" & 16" dia.	75c
Walker Remote	12.50	Elc'mite Coil, 2/3 oz.	1.95
Flightline Reel	1.25		
Music Wire, 3 Ft... 020 &			

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BALSA WOOD Best Quality—36" lengths

STRIPS

1/16 sq.	½c	1/16x5/8	6c	1/64x2	8c
1/16x1/8	1c	1/16x3/16	2c	1/32x2	8c
1/16x3/16	1½c	1/16x1/4	2c	1/20x2	8c
1/16x1/4	2c	1/16x3/8	3c	1/16x2	8c
1/16x3/8	2½c	1/16x1/2	4c	3/32x2	10c
1/16x1/2	3c	1/16x5/8	5c	1/8x2	10c
3/32 sq. 3 for	4c	1/16x3/4	6c	5/32x2	12c
3/32x3/16	2c	1/16x1	8c	3/16x2	14c
3/32x1/4	2½c	1/32x1/2	4c	1/4x2	16c
3/32x3/8	3c	1/32x3/4	6c	5/16x2	18c
3/32x1/2	3½c	1/32x1	8c	3/8x2	20c
1/8 sq. 3 for	5c	1/32x1-1/2	12c	1/2x2	22c
1/8x1/4	2½c	1/32x2	16c	1/32x3	10c
1/8x3/8	3½c	1/32x3	20c	1/16x3	12c
1/8x1/2	4c	1/32x4	25c	3/32x3	15c
5/32 sq.	1½c	1/32x6	30c	1/8x3	19c
3/16 sq.	2c	1/32x8	40c	3/16x3	22c
3/16x1/4	3c	1/32x10	50c	1/4x3	25c
3/16x3/8	4c	1/32x12	60c	3/8x3	30c
3/16x1/2	5c	1/32x24	1.20	1/2x3	35c

PLANKS

1x3	$ .50	3x3	1.50
1x4	.90	3x4	2.70
1x6	.80	4x4	2.50
2x4	1.20	4x6	3.70
2x6	1.80		

SHEETS

1/32x3	10c	1/16x3	12c
3/32x3	15c	1/8x3	19c
1/16x3	22c	3/16x3	28c
3/8x2	20c	1/2x3	35c

Beveled balsa trailing edges, 36" lengths

3/32x3/8	3c	5/32x5/8	5c	7/32x3/8	7c
1/8x1/2	4c	3/16x3/4	6c	1/4x1	8c

Propeller Blocks

8x7/8x1-3/16..	6c	1-3/4	18c	18x1-3/4x2	32c
10x1x1-1/2	10c	Glider Wing Section		9x1-1/2x2	15c
12x1x1-1/2	12c			10x2x2-1/4	25c
14x1-3/16x		16x1-1/2x2	26c	3x3/16x20	18c

CLEAR DOPE THINNER, OR CEMENT — 1 oz. 10c, 2 oz. 20c, 4 oz. 35c, ½ pt. 50c, pt. 70c, qt. $1.00, gal. $3.50.

COLORS 1 oz. 10c, 2 oz. 20c, 4 oz. 40c, ½ pt. 65c, pt. 95c, qt. $1.75, gal. $5.00. Red, Orange, Yellow, Green, Lt. Blue, Dk. Blue, Black, White, Brown, Olive Drab, Silver, Battleship Gray, Woodfiller, Metalic Red, Metalic Blue.

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F6F
U. S. Navy Fighter
$2.75

DYNA-MODEL DOES IT AGAIN!

No one—yes, No one else except Dyna-Model makes such accurately detailed 1/6" scale solid model kits—even to folding wings—such as the pictured Grumman "Hellcat" with its carved fuslage and 23 authentic superbly finished parts, including propeller, engine and duct, cockpit details, landing gear, bubble canopy and armament—$2.75.

Other exciting "Dyna-Mo" kits which give the model builder the chance to give his model that professional touch are:

P51 "MUSTANG"—23 FINISHED PARTS, CARVED FUSELAGE $2.75
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All kits have templates, jigs, decals and engineered drawings.

Ask your dealer for "Dyna-Mo." If he cannot supply you write us direct enclosing check or money order plus 25c for packing and postage—no C.O.D.'s.

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THE NEW LOOK!

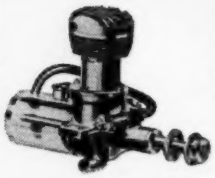
BALT SCHRODER

KIT

$4.95

The *New Look* in controlining! Latest, most complete kit that can be used in all four classes. Fly with an A or B engines for sport or first flights--with C or D engines for stunt or speed. Complete kit with all parts prefabbed. Span 22" Length 18½"

THE MITE DIESEL



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Class A
.099 displ.
9,000 rpm
.5 ins. bore & stroke
wt. 2.6 ozs.

The finest model 'diesel' built. Complete with shut-off valve. No accessories needed Mite diesels have shown their superiority in 2 years' flying.

THE GLO-MITE

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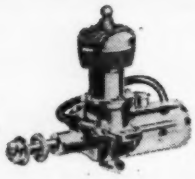

The finest in 'glo' engines with all the features of the Mite Diesel. Head designed for maximum performance with glow plug. Complete with plug.

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YOUR "NOSE" SHOWS!

You pay less for MITE MACHINED-SPUN ALUMINUM SPINNERS!

STREAMLINE SHAPE:

1 1/2 dia.	$ .85	2 1/4 dia.	$1.00
1 3/4 dia.	.85	2 1/2 dia.	1.10
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NEW NEEDLENOSE:

1 3/4 dia.	$1.20	2 dia.	$1.25

Complete in a box, with no chance of lost parts, the MITE MACHINED-SPUN Spinners come to you complete with a *machined-spun* shell; solid, machined nose cap; true-threaded stud and a concentric back plate for smooth running.

Mite Distributing Co.

Oakland Cloud Dusters established a new World Record in Class C Stick rubber-powered category—the record, 14:11.7.

The high school field used by the Oakland *Two Cycle Terrors* is becoming quite popular, but the school coach has requested ships be fueled off the grass or that something be placed underneath the ship. Patches of grass are dying out; if this continues flying will undoubtedly be banned.

Malkom Anderson of *Aero Modelers* of Alameda has received Official Certificates acclaiming him as the fastest in the world in A and B classes. For class A—102.38, and for B—125.72. Both planes were powered by Mal's own engines, known as *Tornadoes.*

The First Annual Hobby and Transportation Show was held at San Francisco with over 100 exciting transportation and hobby displays, jet car races daily with many cash prizes for best entries, and a sensational two hour stage show featuring many big time acts and a well-known band.

Oakland's Second Annual Hobby Model and Homecraft Show held a full week of outstanding attractions at the Oakland Auditorium May 20-26. It included everything from an authentic Navajo Indian tribe to indoor flying exhibitions by the *Cloud Dusters.*

Fresno Gas Model Airplane Club celebrated their 8th year! A 38 mile wind hampered the flyers at the Stockton Free Flight Meet May 2, and because of the wind a good many flyers did not enter. The thermals were terrific, the "Fresno Model News" reports, and caused 15 planes to be lost and over 20 were smashed into the hard runway. Winners in *Class A*—G. E. Davis, Sacramento, 9:25; *Class B*—Dick Chamberlain, Oakland, 11:56; *Class C*—Earl Ford, Coalinga, 15:00. This event was held at Jerusalem Field.

The *Tulare Sky Kings'* Free Flight Meet, held at Tulare May 16, also lost some planes. The day was warm, about 95 with no shade! Results: *Class A*—Fred Ginder, Fresno, 10:21.5; *Class B*—R. H. Spencer, Bakersfield, 9:04.8; *Class C*—Carl Randall, Fresno, 6:26.5; *Juniors*—Fred Ginder, Fresno, 10:21.5.

The Petaluma *Do Little Flyers* 3rd Annual Contest, held May 9, had a record crowd of 214 contestants. Results: *Precision Stunt: Jr. Class A*—D. Hollfelder 135; *Sr. Class A*—J. Ratzlaff 216.5; *Jr. Class B*—J. Pedracci 328; *Sr. Class B*—J. Ratzlaff 316; *Jr. Class C*— B. Thunberg 335.5; *Sr. Class C*—R. Regalia 368; *Jr. Class D*—D. Hollfelder 165.5; *Sr. Class D*—R. Regalia 373; *Speed Events: Jr. A*—L. Malory 48.6; *Sr. A*—M. Anderson 94.73; *Jr. B*—K. Caldwell 78.77; *Sr. B*—M. Anderson 120; *Jr. C*—B. MacKerracher 116.12; *Sr. C*—J Guggemos 118.42; *Jr. D*—E. Barefield 124.13; *Sr. D*—H. Shiman 133.33; *Prototype Speed: Class B*—J. Freshman 64.28; *Class C*—B. Merkins 64.28. *Women's Events:* Lois Soloman 83.5; *Team*—J. Pedracci and J. Harvey 170. *Exhibition Flying Scale:* R. Spinelli—DC4. *Flying Stunt Scale:* A. Bazurto, Sopwith Tripe. *Novelty:* Walter Maus.

The *Ukiah Modeleers* held their 2d Annual U-Control Contest May 23 with 134 contestants competing for the 50 trophies provided by the *Ukiah Lions Club.* Results: *Bantam:* D. Bastian 145; *A Precision*—B. Craighead 135; *B Precision Jr.*—W. King 294; *B Precision Sr.*—D. Rice 299; *D. Precision Jr.*—D. Hollfelder 341; *D. Precision Sr.*—T. Van Dyke 372; *Women*—Helen Mayes 86; *A Speed Sr.*—J. Vlaviano 37.5; *B Speed Jr.*—K.

(*Turn to page* 54)

BURGESS IS FIRST CHOICE OF WINNERS

FOR BOOSTER SERVICE USE

BURGESS BATTERIES

RECOGNIZED BY THEIR STRIPES • REMEMBERED BY THEIR SERVICE

BOEING XL-15

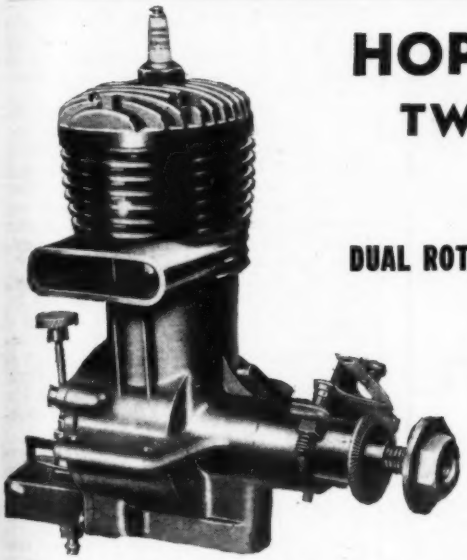
Here is an unsual looking Army Liaison type which should make an interesting model. The September issue of M.A.N. will contain a history of its development plus a detailed 3-View of the original which is ample for model building purposes.

MORE F. P. N.*

*(FUN PER NICKEL)

Nothin' over two-bits is our motto. An' we plan to make a million sky-pushers in the next few days, Gliders, that is, complete with slats, sticks an' tails, all balsa, mostly finished. We do the hard work, you just slap 'em together, launch 'em, sit back an' sigh. We get the blisters. You get the fun of watching the milk truck run smack over the boom just betwixt the camber an' the aspect ratio, whatever that is. But if you're fixin' to scare the wits out of your cat, better shock your dealer an' ask for a few VANGUARD air scoopers. If he ain't got any, send 25 cents an' we'll shoot you a box that rattles nice inside an' gives the most unheard of flights you ever lied about. No extra charge when we snip off our thumbs on the band saw. Our stock of extra thumbs we won't sell at all. Please don't order. Satisfaction guaranteed or we will return your money in 30 years.

VANGUARD MODELS, 113 Sheldon
El Segundo (By th' Sea), California



HOPPED UP—PORTED OUT
TWO – HOTTER THAN EVER
ATWOOD
DUAL ROTARY VALVE ENGINES FOR FREE FLIGHT AND U-CONTROL

The SUPER CHAMPION Model DR $19.50
The GLO-DEVIL Model DR $17.50
(AMA Class D—.624 Displacement)

Factory "Proving Ground" Engines are hopped up to produce the utmost in power. These new ATWOOD engines combine all of the engineering developments incorporated in the hottest "Special" engine we have ever built. They're all "Hopped Up."

30% Increase in By-Pass Area and Volume.

25% Increase in Exhaust Area.

Straight-Through-Venturi—for better performance and easy inverted operation.

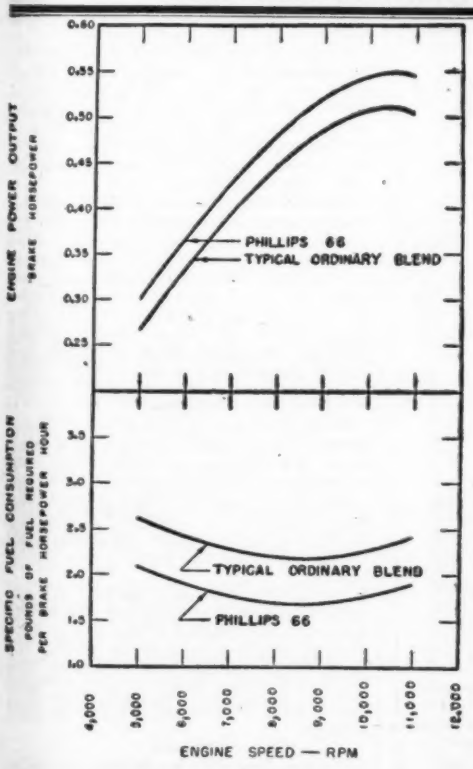
8-1 Compression Ratio.

In stock production engines these improvements have added up to 1000 RPM with a standard 13" free flight propeller.

AND—with either engine you can have your choice of ignition. Install a breaker point system on the Glo-Devil and you're flying on spark ignition. Simply put a Glo-Plug in your Super Champion and you're ready to glow. For stunt flyers who prefer spark ignition a 2-Speed Timer Assembly is also available.

ALL ATWOOD ENGINES ARE FULLY TESTED AND FULLY GUARANTEED

ATWOOD MANUFACTURING CO., 147 Pasadena Ave., So. Pasadena, Calif.



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2½ hour endurance tests show that model airplane engines using Phillips 66 Model Motor Blend *run cleaner!* No need to tell flying enthusiasts what that means in endurance records! In similar tests, engines using 3/1 gas-oil mixture suggested by many manufacturers, showed heavy hard carbon deposits, varnish, and resulting wear on engine parts. For endurance, get this all-purpose fuel identified by the flying Phillips 66 Shield.

Phillips 66

PHILLIPS 66 MODEL MOTOR BLEND

AT LAST-

DRONE is first again with a new type control line model. A "Super Stunt" model having the correct proportions for stunting, yet the appearance and outline of the famous Navion.

A typical DRONE kit,— the **"Stunt Scale Navion"** features all parts completely prefabricated, including hollow leading edge, tapered trailing edge, pre-cut fuselage, bent landing gear, wheels etc.

Available at all Leading Dealers _____ **$3.95**

DRONE "STUNT" WINS

May 2nd, Lansdale, Pa., 1st, 2nd, 3rd
May 9th, Linden, N. J., 1st, 2nd, 3rd
May 16th, Bridgeton, N. J., 1st, 2nd, 3rd
(Most Models were "Secret Weapons")

DRONE DIESEL ENGINE
"Tops in Stunt"
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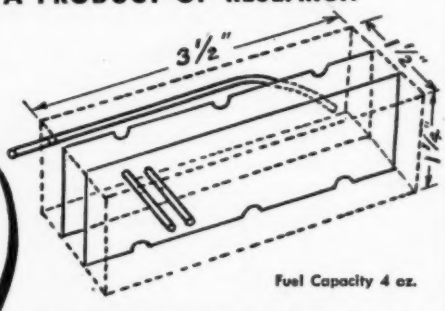

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Results of *Lakewood Model Association's* Free Flight Gas Meet: *Open D*—Lew Mahieu 19:14.2; *Jr. B*—David A. McAllister 7:50.8; *Open A*—Les Haskell 21:25.6; *Open B*—Leta McAllister 15:09; *Sr. B*—David Baker 1:14. *Class A*—Milton Ronney 11:29.6; *Class B*—Wilson 14:40.0; *Class C*—Les Haskel 21:00.0; *Class D*—Paul Gilliam 13:51.4.

J. W. McAlister, Inc. (Fresno, Calif.) announces elimination contest for the International Plymouth Meet on July 11 at Madera & Manning Aves. Events: Outdoor Stick Rubber and Cabin Rubber as well as Class A, B, C, and D Free Flight Gas. This contest open only to flyers who actually reside in the Fresno metropolitan area.

NOTE: The *Richmond Aeromodelers U-Control* contest previously scheduled for July 11 has been changed to August 8 in order to allow the *S. F. Jaycee* to have the July 11 date.

With changes in the new rules and records, the *East Bay Aeroneers* is out to place their names on the lists of record holders. Most of the flying now is done at the Livermore Sky Ranch. It certainly is nice of the Sky Ranch to set aside one end of a field for the Free Flight boys' use.

At a special meeting held April 16, Bill Wreath and Bill Peden were awarded AMA Leadership Certificates by Mom and Pop Robbers, who made a special trip to award the two *Vallejo Sky Jockeys* members. The club is now flying their Sunday sessions at the practice field in back of Corbus Field (high school).

Results of the Rubber and Glider contest sponsored by *Los Angeles AeroModelers* on May 2 are: H-L Glider—Andrew Petersen, 19:32.7; T-L Glider—Ralph Conn, 23:24.4; Class C—S & C Rubber (Combined)—Bob Moncrieff, 21:27.7; Class D—S & C Rubber (Combined)—Bill Atwood, 28:14.6.

Thunderbugs of North Long Beach hold weekly interclub contests for scale and semi-scale control line models. Each model must have motor cowled in, cockpit accommodations to scale, and complete paint job with numbers. Flights are 5 miles; one compulsory refueling stop. Time is taken from ground, through continuous flight, refueling stop, and to the end of 5 miles.

Florida

Earle Duncan, president of *Exchange Aero Club* of Lakeland, says in a recent issue of "Propbuster News" that more cooperative spirit is needed among the members or perhaps (and quite likely) there won't be a club. At Gainesville, Al Brown came out in top place in the U-control Stunt; the prize: a new *Rocket* engine.

Bartow Prop Busters became the seventh state model club to join the Florida Association of Model Clubs in Lakeland. Florida flyers interested in joining this group may contact the organizer, Don Warner at Box 1581, Lakeland. Send items for "Skyscraper News" to same address.

Illinois

We hear from Mickey Evans, a member of the *Parks Cloud Hounds*—the campus model club of Parks College in E. St. Louis—that the article in our April issue which showed photos and gave details of model activities at several flying schools

caused some surprise among model-building Parks' students. Their student publication intimates a wish that model building activity there was as enthusiastic as depicted. Nevertheless some of the active flyers are doing their best to get things stirred up.

Iowa

The Decorah *Skymasters* with the sponsorship of Post 1977 of V.F.W. is holding a control line contest July 25. For more information write Secy. Dick Kulaas, 409 Leif Ericksson Drive, Decorah.

Kansas

E. E. Williams, President of *Leavenworth Eagles* writes us asking what kind of adrenalin is used to bring clubs back to life. He states that though there are 22 members out of a population of 22,000, only *three* show any interest. Yet the city donated a plot of land in the center of town to be used for flying, even helped to fix it up. The club has this field with the guarantee that they will not be chased out for making too much noise! If the U-Jockeys don't know how lucky they are, we do. And hundreds of towns all over the country envy you.

Wichita's *Hy-Flyer Club* held a meet on May 30-31.

Louisiana

William A. Prewitt Jr., Chairman, announces the 8th Annual "Gulf States Model Airplane Meet" will take place July 17-18. The *Louisiana Wing of Civil Air Patrol* and the *New Orleans Aero Club* are sponsors. For additional information and entry blanks write Contest Director, GSMAM, 334 Baronne St., New Orleans.

Maine

Flying Maniacs Annual Model Derby will take place Sept. 12; rain date Sept. 19. Events are: Speed, Jr. & Sr. Stunt, and Beauty Scale. Prizes to be awarded for the first 4 places. For info: Stanley Davis, 6 Allen St., Augusta, or Howard E. Smith at same address.

Massachusetts

Christian Hill M.A.C. is looking for members. Pres. Allan J. Garmon says good flying weather has been non-existent from November to May and several fellows were simply waiting for suitable weather to try out for the flight requirement for membership.

Michigan

Just a reminder, as if you didn't know, that the Plymouth International Model Plane Contest is to be held in Detroit, August 18-23.

The *Ann Arbor Michigan Airfoilers* announce their seventh annual control line contest July 11 at Ann Arbor. Speed, stunt, scale, and jet.

Minnesota

The May Meeting of *Minneapolis Model Aero* Club was held in the Mayor's Reception Room on May 7 when trophies and prizes for the winter U-Control season were distributed. The program featured a Style Show of as many types of models as could be rounded up. The *Minneapolis Dope Fiends* are a group of modellers, all of whom must first be members of the MMAC, and who comprise the "Scientific Modellers" of the latter club.

Missouri

The second annual *Ski-Hi* meet at Fairfax Airport was a huge success according to word received from L. L. Cooke of Kansas City. Mr. Cooke, who will be director of control line activities

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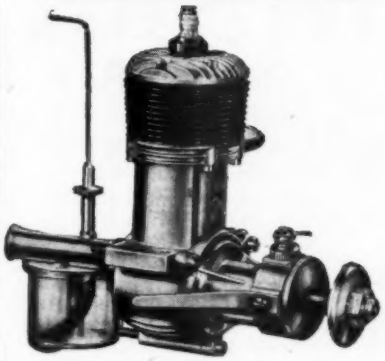

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at the coming Nationals, tells us they had 250 U-Control contestants and 40,000 spectators.

New Jersey

Queen City Flyers of Plainfield has increased both their membership and scope of activities—members include the areas of Plainfield, North Plainfield, Bound Brook, New Brunswick, Scotch Plains, and Watchung. Meetings are held on 1st and 3d Mondays of each month at Plainfield YMCA. The first gathering is for business, the other for remaining business and special activities. During third-Monday meetings, movies are shown, non-flying contests held, demonstrations given, or speakers are invited to address the club. At one of the recent special activities nights a beauty contest was held, the judge being Leon Schulman; of the 16 entries, 6 received prizes of kits and accessories. Between the games of a double-header softball night game of the state champion 5-V team at Canuck Field in N. Plainfield, Nate Heyman and Howie Bueschel put on a U-Control demonstration with Heyman's aluminum "Casalaire" (powered by an *Anderson Spitfire*) which was very well received by the crowd.

The *Kearny Aero Club* desires more members. Every Tuesday at 8 the club meets at 89 Quincy Ave., Kearny. U-Control is most popular, though there are a couple of free flight gas bugs. Free flights are held either at Delawanna or Bendix Fields, 8 to 10 miles away.

The *Bedminster-Far Hills Lions* received sanction for the First Annual Gas Model Meet (Class AA) on Labor Day, Sept. 6, at the Fair Grounds on U. S. Rte. 202 or N. J. 32 in the center of Far Hills.

Linden Model Aircraft Club conducted its 1st annual control line contest at Linden Airport May 9 with over 100 contestants participating. Winners: *Class A Speed Sr.*—Harold DeBolt 90.75; *Jr.*—Homer Orton 86.25. *Class B Speed Sr.*—Harold DeBolt 111.00; *Jr.*—Crosley Fritten 101.25. *Class C Speed Sr.*—Harold DeBolt 123.00; *Jr.*—Eugene Moeller 86.2. *Class D Speed Sr.*—Angelo DiSalve 119.00; *Jr.*—Eugene Moeller 89.5. *Stunt Sr.*—Frank Stanton 335 points; *Jr.*—Faye W. Peoples 200 pts. *Combat events*, all classes combined—1st Danny Mass.

New York

On Sept. 5 the *N. Y. Aeronuts* will hold the East Coast Free Flight Championships, A.M.A. sanctioned. Events will be in four classes, gas and combined towline glider. For info: Sidney November, 593 Lenox Rd., Brooklyn.

The *New York Daily Mirror's* 3d Annual Air Show and Model Flying Fair, held at Bethpage, L. I., on June 6, was more than a success. In three main attractions there were 1,298 entrants; over 200,000 aviation enthusiasts gathered at Grumman Airfield. Two new international speed marks were achieved: Frank Lashek, 32, Manasquan, N.J., flew his champion ship 140.62 mph, topping the old record of 140.57 in the jet class. Walter Wanger, 15, member of the *Westchester Aeronauts Club*, bettered the Class C Speed for juniors with 116.5 mph —the old record was 115.34. Other results—*Free Flight Contest: Class A*—Eli L. Weaver, Bethlehem, Pa., for remaining aloft 778 seconds; *Class B*—Charles P. McGary Jr., Erie, Pa., 689 seconds; *Class C*—Edward W. Keck, Rochester, N.Y., 660; *Class D*—George A. Lincoln, Queens, N.Y., 849. *U-Control Speed Flights: Class A*—Harold F. deBolt, Williamsville, N.Y., 99.77 mph; *Class B*—

Harold F. deBolt, 118.03 mph; *Class C*—Stanley Sieminski, Cleveland, Ohio, 124.13 mph; *Class D*—Joseph C. Campione, Rochester, N.Y., 137.40 mph. *Radio Control Event:* Francis E. McElwee, Elizabeth, N.J., 200 points. *Beauty Scale Event:* Adrian J. Costantino, No. Providence, R.I. *Control Line Stunt Flying:* Francis E. McElwee, Elizabeth, N.J. *Jet Speed Contest:* Frank J. Lashek, Manasquan, N.J., 140.62 mph.

The *Sky-Scrapers* contest scheduled for Aug. 22 will not be held this year, Sec. Paul Yagid informs us.

The *Watertown Aeromodelers* are holding an A.M.A. sanctioned contest July 18. Events: Glider—HL, TL; Rubber—C, S; Gas—Free Flight—four Classes; Control line—Class A, B, C, Stunt.

At Curtiss Airport, Valley Stream, L.I., the *Prop Spinners Club* Radio Control and Payload Meet was held May 2. There were 9 Radio control models on the field. Joseph Raspante of New Hyde Park was the only one brave enough to fly official in the wind. Alan Heins of the *Queens Thermal Thumbers* was top man in the Payload Event.

The *Exchange Club of Olean* held an Official Class AA model airplane meet June 6.

A joint control line meet was held June 20 by the *Flying Bisons* and the *Buffalo Aeronuts*. The *FB* have secured a lease, renewable each year, from the County of Erie to operate the same field they have been using for the past 2 years. They can even advertise the field as their own home modelport.

North Carolina

The *Prop-Twisters* of Greensboro held its 4th Annual Southeastern U-Control contest June 27. This is the *only* club in the U. S. with an all-Jet Division in which they have 19 members. The *P-T* have this point system: each member is given 500 points, and should he fail to do the job assigned or not live up to the rules, points are taken off. If he loses the 500, he is suspended for 3 months, at which time a vote is taken on reinstating him.

Ohio

Supt. of Cincinnati's Lunken Airport has given the *Greater Cincinnati Control Line Modelers* a fine place to fly. The ground is between Davis Lane and the levey. Because of the spring flood, the many modelers will have to cooperate and reshape the flying site. For information: Don's Hobby Supplies, 2131 Washington Ave., Norwood.

Results of *Wooster Model Club's* air show held May 23: *Class A*—Higelmire 90:28; *Class B*—Herb Baughman 92.75; *Class C*—Sieminski 121:57; *Class D*—Ambler 132.3; *Stunt*—Higemire 76 points; *Scale*—Scott, Navion. Wooster has an active membership of 32 and has been organized for 3 years.

Oklahoma

The *Flying Sooners* held a control line contest at Norman, May 15-16. Results: *Jr. Speed*—Maurice Stanglin 112.5; *Sr. Speed*—Fred Cook 139; *Stunt*—David Corley 30 pts; *Combat*—Keith McClure. Speed prizes were awarded on point system. All 18 and over in the Sr. class, others in Jr.

The *Tulsa Model Aeronautics Club* has launched an ambitious 1948 program for Tulsa and surrounding states. It has scheduled contests for July 25, and September 5-6; the latter contest is an approved A.M.A. invitational event.

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Oregon

The *Salem Cloud Chasers* recently elected Bob Olsen as Pres. Also, a U-Control contest was held on June 20.

Pennsylvania

The *Exchange Club* of Meadville held their 2d Annual Gas Model meet July 5; contestants came from Western Penn., N. Y. and Eastern Ohio.

The Mt. Lebanon *Model Wings* Club held their second meet at South Park. Winners: *Sr. Gas*—John Vogel; *Sr. HL*—Ralph Knap; *Jr. Gas*—Jim Hess; *Jr. HL*—Don Schwartz; *Novice Gas*—R. Burgenstien; *Novice HL*—Roger Roman.

The World Hobby Exposition will be held in Philadelphia at Convention Hall-Commercial Museum Nov. 15-20. One may see the greatest display of hobby materials ever assembled under one roof—model airplanes, of course, cars and boats in actual operation and in contests, ham radio and television sets, plastic and ceramic fabrication, electronics—these are just a few of the attractions.

Tennessee

The 3d Annual Tennessee State Model Airplane contest was held in Nashville June 26-27. The Control Line and Free Flight events were held at Smyrna Air Base.

Texas

Cowtown Sahibs have a membership drive on. Interested? Then write to Bob Lutker, 1314 Wesleyan, Ft. Worth 5. The club is highly active in both control line and free flight.

At Miller Municipal Airport in McAllen, the *McAllen Prop Crackers* sponsored a U-Control meet June 6 with all of Lower Texas invited.

Virginia

This news reached us a little late, but the *Balsa Beetles* of Falls Church threw an educational party for their townfolk on April 1. The movie "Youth Takes to Wings," a visual education portion of *Balsa Beetles'* propaganda, was also featured.

Wisconsin

Flying Badgers staged its 2d annual Fond du Lac Championship U-Control Meet at Lakeside Park on June 13. Awards were presented to winners at the dinner in the YMCA following the meet.

Canada

Brian Hockin, 17, broke the Canadian Class A Gas Record with 49:43 for a single flight. The *Canadian Gas Model Club* is indeed proud. (Brian's brother Gordon designed the aircraft.)

The Canadian Nationals will be held in Toronto—Free Flight at De Havilland Airport on Sept. 3, and U-Control at Varsity Stadium, Toronto, Sept. 4. Enquiries to be made to Mrs. L. M. Hockin, 62 St. John Rd. W., Weston, Ontario. This is the Original Canadian Nationals sponsored by the Canadian National Exhibition until 1941, when the *Canadian Gas Model Club* took over as sponsor.

Recently we received word from the *Vernon Model Club* that everything is progressing fine. Membership has increased by 17 since their organization last year, writes Ken Owen, 3008 38th St., Vernon, B. C.

England

On April 11 the first big outing was held at York Airport. However, flying power models in Barnsley, the Industrial

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North of Yorkshire, is found to be quite difficult because the ground not used for building, open cast coal works or crops is also unfit for flying.

South Africa

The Editor of "The Flypaper," official organ of *Eastern Province Model Aircraft Association* (controlling body in the Eastern Province) tells us he would like to correspond with an American modeller of some experience as he has been building models for 10 years. If you are interested in exchanging ideas halfway around the world, on theory and designing of free flight gas, rubber, control line stunt and/or glider models, write Roux van den Merwe, 4 Gipson Rd., Port Elizabeth.

Trinidad

The *Trinidad Model Airplane Club* is planning a contest in August which will be the biggest ever staged in that country.

Design Forum

(*Continued from page* 13)

may be taken off the controls, or the ship may be put into a stalling condition without falling off or diving out of the stall. However, no demonstration of a full scale airplane has shown it to be inherently stable throughout all conditions of flight. In other words, all such airplanes have been stable only under certain conditions.

Mr. Rich goes on to say: "First, we can look at the shape of a plane in general. The low tail isn't practical on small ships, but why not on tricycle gear types? Fin area, small or large, high or low, has a definite bearing on the plane being stable. In Mr. Carter's book *Simple Aerodynamics* he states that to increase lateral stability you must increase dihedral and increase fin area *above* C.G. line. Mr. Carter's theory is that the full scale plane usually *slips*, perhaps out of a stall, and in doing so the dihedral angle and the *high* fin form a combination for recovery. Should the plane skid under power it seems to me that this setup is bad. We are to assume that the danger in full scale craft lies in the slip after the stall and not in a skid as in a model plane. Mr. Grant's theory is to place fin area low to lower the C.L.A. so that in powered flight the plane will recover from a *skid*. It is my belief that few if any gas models *slip* under power because the power loading is so

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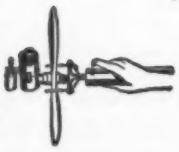

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much lighter than on a full scale plane. The motor in a model plane can nearly pull the plane up vertically. If, after the power is cut and the model plane is in a glide, isn't it reasonable to assume that it may be put in a flight attitude nearing a stall; and if so all it can do is *slip* because it has no power or inertia to skid. Do we reason correctly and is it a probable answer to the question of low fins on full scale craft?"

Mr. Rich has "hit the nail on the head." Apparently all problems of inherent stability roost on the problem of spiral stability, perhaps because spiral stability involves rotation about all three of the airplane's rotation axes. Lateral stability is increased by increasing the dihedral, but only when the plane performs the maneuver of side slipping; in other words when it is flying slowly. It is an aid in lateral recovery when falling out of a stall.

However it most decidedly causes instability in fast turns if, by increasing the dihedral, the C.L.A. is raised above the C.G. Any directional rotation or rotation to one side, with a large dihedral, causes a greater difference in the attack angle of the two wings. If an airplane turns sharply to the left, banking to the left, the attack angle of the right wing increases much more than that of the left. If the dihedral is small this difference in angle is small. The difference in lift obviously is proportional to the difference in angle. So, with large dihedral, in banking and turning to the left under power there is a strong left rotational moment. Under these conditions a plane will bank less with less dihedral.

It is for this reason that we recommend placing considerable area below the C.G. at the forward part of the airplane—in other words bellying down the body below the C.G. This low area creates a counteracting side pressure in the turns that reduces banking, and also therefore the necessity of strong recovery forces to correct excessive banking. Placing area low means lowering the C.L.A., so we come back to our old rule which covers all planes, regardless of amount of dihedral, in respect to sharp banking in turns where skidding takes place. If you design your plane so that the C.L.A. is on a line with C.G. your airplane will be stable in turns, even though it has large dihedral. On the other hand the large dihedral will correct balance in a slip even though there is considerable area below the C.G. This is due to the difference in attack angle produced by the side slip.

There is a point concerning C.L.A. which to our knowledge has never been discussed. It was raised by Richard E Fowler of Muskegon, Mich. in a letter written to us sometime ago: "I have about half completed a Cleveland *Stinson Reliant* 7 ft. gas model in which I plan to use radio control. I am going to use pontoons in order that the C.G. and C.L.A. can be below the thrust line, for maximum stability. Another reason for using pontoons is to take advantage of a larger area for takeoff and landing. I have noticed that when full scale planes are converted to seaplanes, *extra rudder is added.* I would like to determine if that would be necessary in this case; also, do floats require more or less dihedral?"

The answer to this question will automatically provide the correct vertical surface area at the rear. In fact it is not necessary to even calculate the percentage of fin area, relative to wing area. It concerns the *longitudinal position* or *fore and aft position* of the C.L.A. When pontoons are added the C.L.A. will be lowered,

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which is extremely helpful and improves spiral stability. The addition of pontoons to any design not only lowers the area but increases the amount of side area at the *forward part* of the airplane. This naturally moves the C.L.A. more forward. Fin area is usually increased on large planes and should also be increased on models, in such cases, so that the C.L.A. will remain in its original position. In other words, the C.L.A. should be constant relative to the C.G. position in all designs.

Fig. 1 illustrates this condition. First consider the heavy outline with C.L.A. in correct position. Now we add pontoons. This alone lowers the C.L.A. To keep the C.L.A. in the same position the wing is given added dihedral, sufficient to balance the extra side area created by the pontoons below C.G. By adding this area, of pontoons and dihedral, forward of the C.L.A., the C.L.A. moves forward to position A, unless fin area is also added. In other words, in any design the outlines and positions of side areas should be worked out so that the C.L.A. is first on a horizontal line with C.G., and second rearward of the C.G. a distance equal to 20% of the tail moment arm M, or M/5. The latter is an average figure. In some cases the rearward distance might be 18%, in others 22%.

Believe it or not, but designers of full scale airplanes do not follow this procedure but depend upon the pilot operating the controls in order to correct any deviation from normal flight course, deviation that if continued and not corrected would in many cases grow into a disastrous maneuver. In other words, correction is made before the deviation has progressed to a point of danger. This very fact that corrections are made so readily by the operation of controls has made correction appear unnecessary and often covered up the necessity for making the ship inherently stable. If this theory of C.L.A. position is applied to full scale aircraft, the result will be much more stable planes—planes that will fly themselves without the necessity of continual correction by the controls.

* *

Now that the days have warmed up, some modelers will be intrigued with the possibility of building hydros or pontoon jobs. A few hints will save many model builders grief due to "dunking." In the past about 90% of the hydro models had difficulty in rising from the water because pontoons were improperly designed and located. In building this type of plane many followed the pattern of full scale aircraft and placed the step of their pontoon approximately under the C.G., or times back of it. This is correct for full scale planes but not for models.

The trouble is caused by scale effect. The drag of the pontoons on the water decreases much less in proportion to airplane weight when the size of the airplane is reduced. This makes it necessary in models to place the step well forward of the C.G. A good rule is to make the distance between the step and a vertical line through C.G. equal to 40% of the distance, V, from the bottom of the pontoon to the line of thrust. This usually places the step on a line with or forward of the wing leading edge. When the step is too far back the reaction between the propeller thrust, T, and the drag of the pontoon causes the front of the pontoon to "dig in" and the plane to nose over into the "drink." With the step forward as indicated in Fig. 2, the upward pressure on the step at point P tends to hold up the

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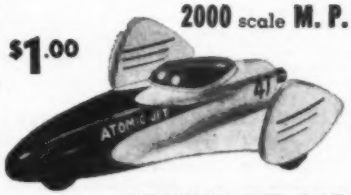

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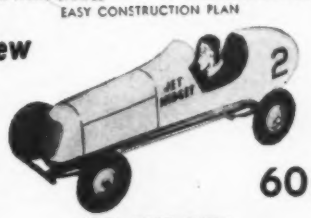

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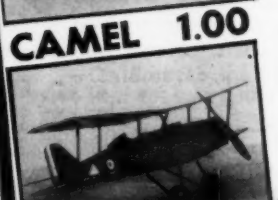

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nose and balance the tipping effect of the propeller thrust.

Another hint which may be helpful concerns the undersurface area of the float. Usually floats have insufficient area to plane off the water easily. It is suggested that you make the total width of the float planing area 4" for every pound of weight. If a model weighs 2 lbs. and has two floats, each float should be 4" wide. A minimum width of 5" for every pound may give you even better results. Do not be afraid to give too much float planing area; it is better to have too much than too little.

* *

Howard H. Lundquist of Minneapolis tells us of his experiments with jet engine planes of different designs. In effect he states it is necessary for structural reasons to place the jet motor above the airplane's line of resistance. Fig. 3 shows a pusher similar in design to Mr. Lundquist's planes. He tells us that due to high thrust and low drag the plane noses into a sharp climb when power ceases.

This problem is similar to the one Robert J. Hall of W. Lafayette, Ind., is concerned (Fig. 4)—a problem present in most low wing designs. The answer is the same in both cases—all angles are figured relative to thrust line. In other words, the same procedure must be followed with both this high thrust jet plane and a high thrust low wing model: set the forward wing at approximately zero degrees, whether the plane is tractor or pusher. Set the rear wing at 2° less angle of attack. Some planes may require a difference in angle that is 1/2 degree more or less. This combination creates a nosing up moment under power that counter-balances the nosing over moment due to the high thrust, so that the ship assumes a normal glide angle when power is off instead of zooming upward.

Mr. Hall also suggests increasing the negative angle of the stabilizer to overcome this effect. This will overcome the nosing-over effect, it is true, but it also introduces an undesired effect. Any difference in speed during glide or power-on conditions will cause considerable change in the longitudinal trim of the airplane. That is, the glide will not be as steady and even. The ship may have a tendency to zoom up sharply and dive again quickly due to the great difference in angular setting between wing and stabilizer. More even flight results when this difference is only 2°; if it is 3° or 4° flight will be more erratic. It is much better to keep this angle at 2° or 2-1/2° and set the forward plane at zero.

Mr. Hall also asks: "I know from experience that the stabilizer area should range around 33% of wing area as you have often written. But nowhere have I found an explanation of why a free flight model with a small stabilizer comparable to the value used in full scale airplanes will not fly. Just why, does a correct scale stabilizer prevent flight?"

Greater stabilizer area on a model is required for several reasons. First, the fuselage weight and rubber motor weight, in rubber driven craft, are more distributed than in full scale airplanes. That is, the moments of inertia about the lateral axes through C.G. are greater, so when the plane noses up or down and the fuselage starts to rotate about this spanwise axes, stronger forces tend to keep it rotating than in full scale aircraft, in comparison to their size. Consequently greater stabilizer area is required to correct these stronger rotational moments.

Second, when a full scale airplane noses up or down the pilot makes correction

when he increases the effective attack angle of the stabilizer by pulling the elevators down. In this way he increases lift of the stabilizer much more than when correction is made by the stabilizer area alone. In other words operating the elevators gives the lifting effect of greater stabilizer area.

A model stabilizer must provide sufficient corrective force by its area alone and by movement of the elevators. At any given angle of attack, the stabilizer of a model must provide corrective force due to its area alone. At the same attack angle the stabilizer of a full scale airplane derives the correcting forces from its area plus the deflection of the elevators.

Send your problems for discussion to "Design Forum," MODEL AIRPLANE NEWS, 551 Fifth Ave., New York 17, N.Y.

Ginger Snap

(*Continued from page 15*)

we have ever flown but it has a large amount of control surface. This surface is necessary to make possible the ability to really get out and do stunts. Takeoffs must be made very carefully since the ship, if given full up, will at once do a wingover, and usually, unless the maneuver was expected, a fatal one. Once the model has developed flying speed it loses the great sensitivity to control it has at low speeds. On short lines it is even possible to do a full power stall and land the ship under power. Takeoffs from this stall are made by giving the ship a little down to allow it to reach its flying speed again.

When flown with a *Micro-Diesel*, an engine with .130 displ., the ship is neither over nor underpowered. Its performance with other engines around this displacement will be excellent. In general when flown with engines of this power—and this includes gasoline engines up to .230 displ.—no undue sensitivity to control may be expected. Larger engines will make the ship much too sensitive to control, and the elevator area must be cut down.

When flying small ships of this size too much emphasis cannot be placed on flying with your arm rather than your wrist. The use of wrist type flying just will not go with this type of model; it will fly much better when operated with the smoother control the arm movement affords. The ability to do power landings is an indication that stunting must be done smoothly. In order to loop, the mere applying of full up with a sharp motion will only result in a power stall, the ship will not loop. For looping and any other maneuver always enter the maneuvering with plenty of flying speed and with a smooth application of control.

Propeller choice is of course dependent on the engine used; however we used a 9", 6" pitch prop. The ship's lightweight makes possible an amazing range of speeds; merely reducing the diameter of the prop and increasing its pitch will make the ship move much faster. Large low pitch props slow the model down, yet allow it to perform well just the same. The original model, incidentally, weighs 9½ oz.

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Roamer 45"	2.95
Rocketeer 40"	2.95
Playboy jr. 55"	3.25
Buccaneer B Spl. 54"	3.95
American Ace 54"	3.95
Bay Ridge Mike 43"	2.00
Air Foiler 44"	3.95
Pixie A 42"	1.95
Musketeer 54"	3.50
American Ace 36"	1.95
Interceptor 51"	2.98
Skyrocket 36"	2.95
Musketeer 42"	2.50
Brigadier 58"	2.95
Larkey 50"	3.50
Mercury Jr. 50"	3.95
Good News 50"	3.95
Powerhouse 41	3.95
Powerhouse 56"	4.95
Luscombe Silvaire 43"	3.00
Humdinger 52"	3.95
Brigadier 38"	1.95
Easterner 42"	2.50

Class C & D

New Buccaneer St'd	5.95
Custom Cavalier 108	17.50
Piper Cub Super Cruiser	10.95
Flamingo Amphibian	9.95
Playboy Senior	6.00
Westerner C	5.95
Pacer	4.95
Mercury	5.50
Stinson Reliant	17.50

SPONGE RUBBER WHEELS

2" dia.	.40¢
2½" dia.	.50¢
3½" dia.	.60¢

ALUM. TUBING

Dia.	¡ per ft.
1/16"	.10¢
3/32"	.10¢
⅛"	.12¢
5/32"	.12¢
3/16"	.15¢
¼"	.18¢

GLO-PLUGS

Arden Glow Plug	.85
Hot Point Plug	.85
Ohlsson Glow Plug	.85

MISCEL.

Silkspan 00	.05
Silkspan GM 3 for	.25
Take-off Dolly	1.00

PURE BROWN NATURAL CONTEST RUBBER AT PRE-WAR PRICES

⅛" flat, per ft.	$ .01
3/16 flat, per ft.	.01½
¼" flat, per ft.	.02
⅜" flat, per ft.	.03
½" flat, per ft.	.04
¾" flat, per ft.	.06
1" flat, per ft.	.08
1½" flat, per ft.	.12
2" flat, per ft.	.16
3" flat, per ft.	.24
⅛" sq., per ft.	.02
¼" sq., per ft.	.04
⅜" sq., per ft.	.06
½" sq., per ft.	.08
¾" sq., per ft.	.12
1" sq., per ft.	.16
1½" sq., per ft.	.24
2" sq., per ft.	.32
3" sq., per ft.	.48

Balsa Cement	.10¢
Balsa Cement	.25¢
Balsa Cement	.50¢
Balsa Cement	1.00
Balsa Cement	2.00
Balsa Cement	4.00
Balsa Cement	8.00
Balsa Cement	16.00
Balsa Cement	32.00
Balsa Cement	64.00
Balsa Cement	128.00
Balsa Cement	256.00
Balsa Cement	512.00
Balsa Cement	1024.00
Balsa Cement	2048.00
Balsa Cement	4096.00
Balsa Cement	8192.00
Balsa Cement	16384.00
Balsa Cement	32768.00
Balsa Cement	65536.00
Balsa Cement	131072.00
Balsa Cement	262144.00
Balsa Cement	524288.00
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Balsa Cement	2097152.00
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A respected designer and contest sport has joined Berkeley's staff of Championship free-lance designers.

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Wingspan 36" · Wing Area 100 sq. in.
With Free Wheeling Propeller

Here is a great kit that builds the latest cabin design of the International Cabin Champion and the World's Record stick model. Only Berkeley can give you such a sensational value. A kit easily constructed by beginners and can be flown against experts. Wings, tail and propeller are interchangable on both models.

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New England Champ!
Dixie Champ!

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POWERHOUSE "41"
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POWERHOUSE "56"
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POWERHOUSE "62"
Weighs 40 oz. Wingspan 62"
Wing Area 572 sq. in For .35 to .62 engines
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SOLD THRU

BERKELEY

DEALERS & DISTRIBUTORS

(*Continued from page 34*)

Saturday, August 7

Radio Control
Control Line Speed, Class C
Free Flight Gas, Class B
Mulvihill Stick (Rubber Powered)
International Wakefield Event (U. S. Team Qualifications)

Sunday, August 8

Radio Control
Control Line Speed, Class D
Free Flight Gas, Class A
Free Flight Gas Seaplane
Control Line Stunt
Control Line Speed, Jet Powered
Victory Banquet, 7 p.m.
Presentation of Awards, 8 p.m.

Special Announcements

Those who desire entry blanks and other information should write: Dale Dorst, Contest Manager, Olathe, Kans.

Officers and committee members of the AMA have been requested to arrive in Olathe a day or two in advance of the opening of the contest for official meetings of the Academy boards and committees. Announcements of these meetings will be made through the officials from Washington and Topeka.

Flash

(*Continued from page 9*)

art as routine operation with a full squadron of McDonnell FH-1 *Phantom* jet fighters being launched and retrieved aboard the U.S.S. *Saipan* off the Atlantic coast. As though this feat were not extraordinary enough, the Navy chose one of the smallest carriers afloat (610 ft. deck length 73 ft. wide) for the tests! Squadron VF-17A has now qualified all its pilots for carrier sea duty with the *Phantom*, becoming the first squadron in the world to achieve that honor. (Squadron VF-5A flying North American FJ-1 *Fury* jet fighters had operated only two planes from the *U.S.S. Boxer* off the Pacific Coast at the time of *Phantom* trials.) This certification of a jet carrier squadron as fully operational should end once and for all the controversy that has raged regarding long takeoff run requirement, "inability" to take a "waveoff," danger of the jet to the deck crew, etc.

MOST POWERFUL turbojet engine in production is the new General Electric TG-190, an improved version of the widely used TG-180 design but rated at 5000 lbs. thrust and capable of producing over 6000 lbs. Advantage of the new engine is the fact that its dimensions are same as the TG-180, permitting its installation in jet fighters and bombers already powered by the earlier engine. First flight tests of the new engine are being carried out in North American XP-86 sweptwing jet fighter at Muroc Air Force Base. This added power is expected to bring the speed of the fighter to the near-sonic mark and possibly into the sonic realm. The sweepback feature permits the wings to operate in virtually "subsonic" airflow while the airplane itself is flying at supersonic speed.

FIRST SONIC SPEED fatality in the comprehensive high speed piloted flight research program of NACA-Air Force-Navy is Howard C. Lilly, NACA test pilot, who lost his life in the crash of the record-breaking Douglas D-558 *Skystreak* at Muroc Base. Lilly was taking off on a research flight when the engine turbine lost some of its blades, the imbalance causing the turbine to disintegrate and tear the fuselage in two. The blood-red *Skystreak* heeled over and crashed at a terrific speed. Two other *Skystreaks* are still available for the program, with NACA and the Navy each flying one. First pilot to lose his life in a sonic speed test flight was England's Geoffrey DeHavilland, who was killed late 1946 in the sweptwing DeHavilland DH-108 research plane.

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Order from GOTHAM, the hobby company that is owned and operated by Ex G.I.'s. Below is a partial list of items we carry. Remember, we carry everything that is advertised in this magazine, so select what you want from our ad or any ad and use simple ordering instructions below. If mfrs. have dropped prices on any item you order, we will issue credit.

Pacemaker '59' $12.50 ENGINES

Class A

Arden 099	$12.50
Arden 099 BB	15.50
Arden 199	18.50
Bantam 19	16.50
Deezil Glo Plug	9.95
Ohlsson 19	10.95

Class B

Forster 29	$14.85
McCoy 29	19.50
Mohawk Chief	8.95
Ohlsson 23	10.95
OK Super 29	16.50
Sportsman Jr.	14.95
Torpedo 29	18.50

Class C

Atwood 60	$17.50
Contestor 60	18.50
Forster 99	24.50
Fox 59	29.95
Hornet 60	22.50
McCoy 49	25.00
McCoy 60	27.50
Ohlsson 60	11.95
OK Super 60	18.00
OK Twin	55.00
Pacemaker 59	12.50
Sportsman Sr.	16.95
Super Cyclone	18.95
Super Cyclone Dual Ignition	19.95

DIESEL ENGINES

Deezil "A" Kit	$ 5.00
Deezil "A"	12.95
Micro "A"	18.50
Movo "A"	14.95
Aero "B"	16.50
Drone "B"	14.95

JET ENGINES

Dyna-Jet	$24.50
Dyna-Jet Red Head	35.00
Minijet	35.00

CO2 ENGINES

OK CO2	$ 4.95
Campus CO2	12.50

GAS MODEL PLANES

U-CONTROL GAS KITS

Capitol 400	$ 4.95
Laird Super Solution	2.25
Hotrock	3.95
Dronette	3.50
Stunt Ace	3.50
Speed Wagon	4.95
Miss Liquid Dynamite	1.95
Flying Maniac	6.95
Perky A	2.00
Stardust	10.00
The Bat	2.95
The Bug	1.50
A. J. Fireball	7.95
Miss Behave	3.95
Beechcraft	9.95
Super Zilch	4.95
Junior Cruiser	5.95
Falcon Sportster	3.95
Fokker D-7	7.50
Bearcat	6.95
Cyclone	4.95
Super V Shark	4.95
Whirlwind	7.95
Bipe Trainer	3.95
Ercoupe	7.50
Baby Miss Behave	2.95
Answer	2.00
P-51 Controliner	7.95
Navion	3.95
Gruman Bearcat F8F	5.95
Skystreak	1.95
Skycycle	7.50
Navion (Capitol)	7.50
Streamliner	4.00
Sharpie De luxe	2.00
Fireball	3.95
Custom Cruiser	10.00
Orbit	6.95
Greyhound	3.95
Zing	4.95
Speedster	3.95
Cadet	3.95
Trainee	3.95
Curtiss Hawk P6E	6.95
Whippet	3.95
Tyro	3.50
Strato Cat	5.95
Fireball Fighter	8.00
Vought Corsair	6.95
Gee Bee	2.95
Circle King	1.00
Stunt Ace	3.50
Sky Buggy	5.95
Demeco Special	7.95
Baby V Shark	2.95
Super Cinch	2.95
Monocoupe	4.95
Lil Zilch	2.95
Buster	2.50

FREE FLIGHT GAS KITS

Class A

Buccaneer 36	$ 1.95
American Ace 36	1.95
Super A Skyrocket	2.95
Brigadier 38	1.95
Piper Cub Coupe	1.95

Class B

Buccaneer 48	3.50
Brigadier 58	2.95
Buccaneer Spec	3.95
Playboy Junior	3.25
Zipper	5.95
Humdinger	3.95
Westerner B	4.50
Brooklyn Dodger	3.95
Powerhouse	4.95
Coronet	2.50
Airfoiler	3.95
Interceptor	2.95

Class C

New Buccaneer St'd	5.95
Custom Cavalier 108	17.50
Piper Cub Super Cruiser	10.95
Flamingo Amphibian	9.95
Playboy Senior	6.00
Westerner C	5.95
Pacer	4.95
Mercury	5.50
Stinson Reliant	17.50
Buzzard Bombshell	9.95

ACCESSORIES

Bell Crank	$ .25
Control-It	1.95
E-Z Just Handle	.69
Jem Control Handle	2.95
Jem Pump Can	.75

AND ALL NEW ONES

Modelaire Handle	.90
Sullivan Stranded Control Wire	3.00
Swivels, pair	.30
Thum-It	1.95
U-Reely Control	7.50
U-Reely 2 Speed	12.50
Wire—140'	.75
Froom 13/16" Spinner	.30
Froom 1⅜"	.75
Froom 1½"	1.00
Froom 1¾"	1.00
Froom 2"	1.15
Froom 2¼"	1.25
Froom 2½"	1.50
Froom 2¾"	1.75
Union Prop Nut for Froom Spinners	.20
Plastic 1½"	.50
Plastic 2"	.75
Cement—large tube	.25
Cement—pint	1.00
Dope—clear or any color—pint	1.00
Bright Star #450	.65
Flashlight Cell	.10
Penlite Cell	.10
Power Plus 5 Plate	2.25
Power Plus 7 Plate	2.95
Power Plus Charger	4.45
Vitamite Wet Cell	2.35
Aero Featherweight	2.50
Aero Quality	3.00
Smith Competitor	1.95
Smith Firecracker	2.75
Aero Metal Condenser	.35
Paper Condenser	.20
Socket Wrench	.50
X-acto Blades pack	.50
X-acto #51 Set	1.00
X-acto #62 Set	2.00
X-acto #77 Set	3.00
X-acto #83 Set	5.00
X-acto #86 Hobby Chest	10.00
Arden Flight Timer	1.50
Austin Timer	1.50
Silkspan Sheet	.10
Sterling Test Block	1.50
Vibra-Tak	2.00
Flo-Torque (8"-14")	.35
Flo-Torque HiBall	.65
Ritepitch 8"-11"	.50
RitePitch 12"-14"	.60
Xcell (any size, any pitch)	.60
Arden Booster Jack	1.50
Austin Booster Jack	1.25
Glow Plug	.85
Glow Plug Adapter	.25
High tension wire	.20
Spark Plug—any size	.50
Switch	.50
Wire, Ignition, ft.	.03
Alligator Clips	.12
Battery Boxes (all sizes)	.40
Celluloid—sheet	.10
CO2 Jets	.10
CO2 Props	.15
CO2 Jet Gun	.65
Flywheels	
Class A	1.00
Class B	1.50
Class C	1.75
Leader Wheel Hubs	.25
Motor Mounts A & B	.35
Motor Mounts C	.60
Neoprene Tubing Per ft.	.35
Oil, SAE #70, pint	.70
Paint Brush	.10
Rubber, ft.	.03
Sandpaper, pack	.13

AND EVERYTHING NEW

DEEZIL 'A' $12.95

RACE CARS

Thimbledrome with engine, ready-to-run	$19.95
Dooling	45.00
Hot Rod	42.50
Invader	42.50
McCoy	42.50
Reuhl	24.95
Thimble Drone	3.95
Drone Gears	3.00

BOATS

Marlin	8.50
O-Gee	10.95
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